RAILROAD GAZETTE

SATURDAY, APRIL 10, 1875.

Contributions.

Pin-jointed Bridges versus Riveted Lattice Bridges in America.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Descriptions of executed work given for the purpose of information will always be of great interest, and their discussion may lead to improved practice when the data contained therein are *correct* and *complete*, and when the accompanying arguments are *definite* and *convincing*.

The two papers which have lately been communicated in favor of the Springfield lattice bridge are believed not to come quite up to these conditions, and not to be sufficient to give a true picture of the real value of that structure. The weight of 354,116 pounds for one 177 feet double-track span does not contain the lateral top and bottom bracing. Hence it also is not possible to decide whether the other datum of 177 tons as total weight is to be understood with reference to light or to legal tons. In my letter of Feb. 27 I suspected that short tons were meant, which—though not correct—would make the figures appear more favorable.

The rest of the data of the description of the bridge were given in such a form as to make still more uncertain the main points on which professional judgment could be founded. To this lack of clearness I have already drawn attention in my letter of Feb. 27, but having lately received information concerning the specification for the Springfield bridge, I can now better discuss the subject.

According to this specification, the bridge was required to carry a live load of 3,000 lbs. per foot and track, for web system and floor as well as for the chords.

This specification is not very commendable, and in accordance with the principles leading to good proportions and admitted both in the old and new world we may say that this live load is rather heavier than necessary for the top and bottom chords, that it is too light for the web system in the center of the span, and that *it is too light by about 75 per cent.* for the floor system, especially since the panels are but short. This floor, being very light, constitutes one of the various reasons why a firm of the highest standing and best facilities, adhering to their principles of floor construction, was prevented from receiving the award of the work.

Again, as I suspected, the height of the trusses is reported to have been fixed upon, though every professional bridge-engineer must know that each system has its peculiar proportions of height to span. Also herein the lattice plan was favored in the specification.

It will not be astonishing that, according to my information, the specification had no clause for quality of material, and the tensile iron—more especially—was not required to be of an extra brand or of double-refined stock. The specification simply called for maximum strains of 10,000 pounds for tensile and 8,000 pounds for compressive members, without any reference whatever to quality or to shape and office of the members. When the top chord of the Springfield bridge, or when its angle-posts, can be strained to 8,000 pounds per square inch, there is no reason why more perfect sections cannot be loaded to 10,000 and more pounds. When Mr. Philbrick's bottom chord theoretically can be strained to 10,000 pounds, a well-proportioned and well-arranged bottom-chord, composed of weldless links of double-refined iron, connected by short and strong pins, can be loaded safely to 12,000 and even 14,000 pounds.

Without entering into this comparison any deeper, I only remark that practical men know that iron in plates 30 in. wide is not of so high a quality as that of flat bars made in an ordinary mill, and these men also know that merchant angles are made of a material far inferior to double-refined iron.

We are informed that the bridge was very carefully designed. By comparing the figures of the table of strains and sections (strains are quoted in tons whose number of pounds is not stated, and of the sections in inches it is not specified whether they are net or gross sections), I find that the compressive strains, though specified to be limited to a maximum of 8,000 pounds, with the exception of the two first panels of top chords which could not be made lighter, are as follows: 9,010, 9,020, 9,020, 8,590, 8,872, 9,040, or in the average over 11 per cent. higher than specified.

Having now sufficiently shown that my suspicion with reference to the reliability of the claim for superiority of the Springfield bridge was not without reason, and that I cannot be blamed for not believing this bridge to be "well worth taking notes upon," I shall follow Mr. Philbrick step by step in his arguments and explanations, and I hope to be able to show that this gentleman has disproved nothing of what I have asserted.

The main point of my letter concerning the value of lattice bridges such as built at Springfield was this: The vertical top and bottom plates of the chords built in channel form, forming a portion of the area of these chords, are also used to connect the ties and struts, and, *not being reinforced*, are charged with the double office of carrying chord and of carrying tie-strains, involving an *accumulation of strains* which totally annihilates the prime claim of the specification, according to which no tensile *strains shall be more* than *ten thousand pounds* per square inch.

On various occasions I have had an opportunity to remark that it is not in the calculation of the general strains of a structure that the designer may show his skill, for this calculation, so far as really valuable general systems are concerned, may be taught to any one familiar with this law of the lever within a week's time, but that by far the more difficult points of bridge design may be found in the proper understanding and consequent arrangement of the details.

Mr. Philbrick, in his reply to the discussion of the above-mentioned accumulation of strains at the joints of his bridge, takes refuge from the weight of the criticism by trying to represent my arguments as absurd, myself as ignorant of the first principles of strains in bridges, and my conclusions as without sense.

Undisturbed by these tactics, I now try once more to treat the same question, and refer to the subjoined diagram.

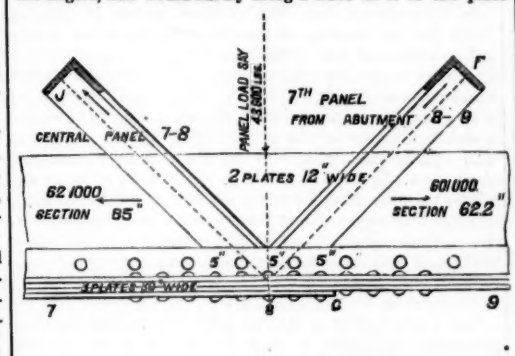
The figure represents the bottom chord of the central one of the 15 panels of a span of the Springfield bridge, which in Mr. Bartlett's diagram is contained between the numbers 7 and 8. It further refers to the central of the three trusses of his bridge.

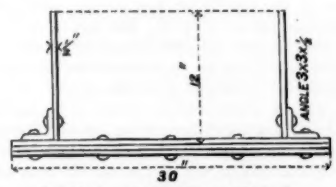
The dead load per lineal foot assumed at 2,000 lbs., and the live load at 6,000 lbs. per foot, I estimate the maximum tensile chord strain at 627,000 lbs., which is about the same as that calculated by Mr. Bartlett.

I do not conceal the fact that not much reliance should be placed in the calculation of these strains, since, whatever *dogma* the defenders of lattice bridges may hold, it is mathematically impossible to calculate at all the strain in any member of a structure of this kind. On the contrary, it is necessary to make an arbitrary assumption, and after this unscientific and unproved escape from the difficulty, to continue the application of more or less scientific rules.

According to Mr. Philbrick's statement, in the Springfield bridge the increase of area is made up immediately at each joint (though I know that in one at least of this gentleman's designs this principle is not carried out). Under this supposition the plate, 8—c, would require 2.6 inches of bearing rivet section, equivalent to 6 7/8-inch rivets, and these rivets, when staggered, would stretch over 5 in., beginning from joint No. 8.

Now it is evident that these rivets would not uniformly distribute the strain of 26,000 lbs. over the plate, much less over the angles, and would hardly bring a trace of it to the place





Section of Bottom Chord.

where the diagonals, 8—F, are connected to the 12×1/16 in. vertical plates.

On the contrary, if Mr. Philbrick will properly examine the strains which have to be endured by those few rivets and by the material in contact with them, he will arrive at the conclusion that as often as a *sudden change* of section is accomplished by riveting a new plate to any member, there will arise permanent sets of the material accompanied by correspondingly great local strains. This phenomenon is a parallel to the diminution of the strength of shafts and axles with sudden changes of section. This is an objection to all riveted structures; it has become evident in all experiments made with such work, and is sure to tell in future.

The 12×1/16 in. vertical plates, from what we have said, can at best only be supposed to be strained nearly uniformly with the rest of the chord 8—9, and in fact it is more likely that they are strained *higher* than the rest of the 30 in. plates of this chord.

It is further shown that the rivets in 8—c have not yet extended their influence to the place where the diagonals 8—F are attached. Nor is it to be supposed that the rivets which connect 8—F with the 12 in. plates are uniformly strained, but that those nearer to the cross bearer are strained more than those further off.

The consequence of these arguments simply is the reaffirmation of my assertion that at *each joint of a riveted lattice structure designed like the Springfield bridge, the strains caused by the rivets of diagonals must be added to the full maximum strain for which the chords have been designed.*

Mr. Philbrick thinks that his supposed reinforcements of the chord 8—9 by the plate represented by 8—c forms a great aid to the joint. In the present instance at joint 8 this aid could only amount to $\frac{65}{65}\times\frac{62.2}{65}\times 10{,}000 = 430$ lbs. per square inch, if this supposition of help from those six rivets were not wholly illusory.

Again, even this at best trifling aid does *not* apply to the diagonal 8 J, where even Mr. Philbrick cannot help admitting that the strains caused by the rivets of the diagonal must be added to the supposed maximum of 10,000 lbs.

It has, however, escaped Mr. Philbrick's notice that I should have added to these 10,000 lbs. of the 12-in. plates not the full amount of 10,000 lbs. of the rivets of the diagonals, but only the horizontal component, namely, 7,000 lbs.; but even with this correction the calculated strain per square inch at the most exposed rivets is equal to 17,000 lbs. per square inch.

Of course it is therefore necessary to reinforce the joints of riveted structures, just as in any well-designed pin-jointed bridge the joints are reinforced, or, better still, are properly proportioned by the thoroughly sufficient medium of a separate joint box.

Mr. Philbrick feels the weight of this argument, but he would better not leap over the difficulty by using an explanation like this:

"If iron were not an elastic substance and were capable of yielding appreciably within safe limits, there might be some sense in such a criticism, but in that case iron would not be suitable to build with, and no iron bridge ever yet built would endure long."

Mr. Philbrick does certainly know that iron cannot yield more in one place than in another without being accompanied

1. By *correspondingly higher strains.*
2. By *either moments of flexure or by moments of torsion.*

When an engineer follows the usual rule of specifying the maximum safe strain at 10,000 lbs. per square inch, how can he defend strains at the joints of say 17,000 lbs.? The elasticity, or rather plasticity, indeed, is a most desirable quality of iron, for its application to many designs, but when Mr. Philbrick in his specification does not claim and when he does not enforce the plasticity of the material, he will receive angles and plates of a quality not much better than cast-iron under tension, being of a dry, unyielding nature and likely to be already injured by the punch so as to lose 30 per cent. of its strength.

Mr. Philbrick says: "Moreover, there are rivets enough connecting each part of the chord with the rest to render it impossible to strain one part more than another, for every strain is accompanied by an equivalent elongation, and one piece cannot stretch without the others."

This expression is by far too general, and it is not necessarily true. In spite of *any number of rivets* important unequal strains will be produced if an addition of section is not at least symmetrically arranged around the centre-line of gravity of a member. This symmetrical arrangement is impossible with the irregular forms of section, like the chords and braces of lattice bridges. In this regard I call attention to the principle of least resistance. (See "Scheffler on Arches.") According to which forces come to equilibrium by such changes of form as are accompanied by a minimum of total labor.

In this regard, also, I repeat that uneven strains, in spite of any number of rivets, will exist in a member when the possibility of a moment of flexure or a moment of torsion can be supposed.

Mr. Philbrick is right when he says that these same claims must be made with regard to pin-jointed bridges, but they cannot be met by the plasticity of the iron. Not only must the joints be re-enforced in the top chords for *bearing*, but also for *uniform distribution of the strains.*

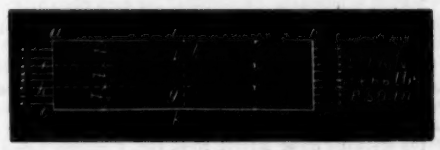
The bottom chords must be as compact as possible, and the pins must be stronger still than those of the top chord, with distinct and well-designed joint-boxes. The bars must be *wide* and *flat;* the pins should be at least as thick as the bar is wide, in order to reduce to a minimum the difference of strain which exists between those parts close to the diagonal and those farthest away from the addition of a new strain. This fact is well known and understood now; it has been ably set forth by Mr. Whipple, and independently from this gentleman I have called attention to it on pages 50 and 51 of my paper on "Pins Used in Bridges," published by D. Van Nostrand.

Mr. Philbrick says I make a gratuitous and rather uncourteous assumption that the actual strains at the circumference of a rivet hole are larger by far than assumed in the calculations of rivet joints.

Mr. Philbrick informs us emphatically that he had made what he considers a new and great improvement by limiting, as consulting engineer, the strain per square inch of section for rivet bearing as the product of the thickness of plate into diameter of rivets.

I knew that Mr. Philbrick had stipulated this rule, and had thereby simply done what I did eight years before and what probably was done by many engineers before me. I have never considered this improvement otherwise than dictated by common sense; but, following other engineers, I have used two rivets when but one was necessary according to rule, and three rivets when two seemed sufficient, and in all cases four rivets when three were required in details which seemed doubtful.

What I really meant with the greater strains at the circumference of rivet holes is very clearly set forth in Mr. Forney's "Catechism of the Locomotive" (page 93), and was explained in the *Railroad Gazette* several times, and is proved by reference to the subjoined diagram.



a b c d represents a strip of iron, say 3×1 in., with a rivet hole of 1 in diameter cut from a tensile member of a bridge.

It is assumed that the net area was intended to carry 10,000 pounds per square inch, and that the strains are uniformly distributed over the fibres, except at the hole, where they *cannot* be uniformly distributed.

The net area being two square inches, the total strain will be 20,000 pounds, and the strain per square inch, except at the rivet hole, will be 6,666 pounds.

At the hole, *i k* plus *g h* must carry not only the strains which were originally in the iron, but also the strain which was

contained in the lost strip *e e ff*. This strain=6,666 pounds ×1 in.=6,666 pounds, or 3,333 pounds on each side of the central line, must be carried by the remaining section, and it must be transferred by shearing strain along the lines *e k* and *e g*.

If iron had the accommodating habit of distributing this strain uniformly over the net area, all would be right; but in accordance with the principle of least resistance, iron will not do that. The lion's share of the quantity of 3,333 pounds will have to be carried by the fibres close to the *circumference of the hole*. The American Master Mechanics' Association has made experiments which proved a loss of 36 per cent. by punched and of 16 per cent. by drilled holes. Mr. Philbrick will probably find surprising results by repeating these experiments with strips of tank iron or ship plate iron.

Indeed, *true strains* along *l k* (taking place in bridges calculated for 10,000 pounds) will much better come to light by breaking unyielding material instead of very plastic iron like the Swedish brands.

In my letter of Feb. 27 I stated that it is not the best design to unite light pieces to very heavy ones, and that in consequence thereof accumulations of strains must result. What has been said with reference to sudden changes of section may explain this, and I must reserve the analytical proof to give when I shall try to discuss the strains of riveted plate girders, on which occasion I hope to show by facts and figures that the durability under wear and tear stands in very close—almost direct—relation to the maximum strains at the joints.

Mr. Philbrick continues to remark that *cast-iron* joint boxes would break up all continuity in the top chords, and that such recommendations will not be likely to be generally adopted for railroad bridges until wheels cease to break or get off the track.

So far as cast-iron wheels are concerned, we know positively (besides experience in this country compare the official reports on chilled wheels made by Ganz in Hungary) that they do not break more frequently than wrought iron wheels, and we may rather fear that giving out contracts for lattice bridges to the lowest bidder will soon result in the application of wrought iron, of about the quality of iron rail heads.

Continuity of top chords by riveting is neither necessary nor desirable, as about 50 miles of bridging constructed in this country prove sufficiently, but danger from broken wheels and rails and from trains leaving the track will be avoided by:

1. Not building floors for 3,000 pounds per foot, but by substituting the heaviest concentrated loads of locomotives, and moreover by straining the iron in the floors less than is done in the Springfield bridge, more especially so when riveted work is used.

2. By using much more, say twice as much, timber as has been applied in the Springfield bridge. In this bridge, according to Mr. Bartlett's statements, only 30 feet B. M. per lineal foot of track are used, when about 60 feet would have been considered necessary to make a substantial floor with guard rails and floor planks to prevent accidents.

3. By making proper arrangements to prevent trains which have left the track just before the entrance of the bridge from running against its trusses, such precautions being very desirable for any style of structure.

If distinct cast-iron joint-boxes of *proper construction*, which thus far form the only detail by which strains at bridge joints can be transferred uniformly over the various jointed members without accumulations of strains, by some engineers are not deemed sufficiently strong, they can be made of steel, though in the writer's judgment good cast-iron is precisely the material that we want.

Mr. Philbrick speaks of his observation of deficiency of workmanship of bridge links, and that he has noticed unequal strains, some of the links being loose when others must be overstrained. Far from seeing in this observation a fault of pin-jointed link bridges, I recognize this fact as one of the advantages offered by such designs. In a pin-jointed link bridge every fault of workmanship can be detected. In a rivetted bridge the unequal strains are hidden and bad workmanship *can readily* be hidden. The machinery for boring links is as perfect as can be desired, which anybody will acknowledge who has inspected the shops of the first class bridge firms of this country. It is simply negligence of workmen and of inspectors when links are not of equal length between bearings.

Different is the case with punched and riveted work, and if the material maltreated under the punch and drift pin could give evidence of what it has suffered, like a silk dress spoiled by the maker, it would be full of folds, and the number of admirers of such work would soon melt away. Many of them would doubtless soon come to the same conviction if they were to spend a sufficiently long time at shops where cheap rivet work is done. They would notice remarkable changes in the length and shape of bars and angles after they have been punched; they would be astonished to measure the differences of distances of work 'aid out, the multifarious mistakes made thereupon in punching, the bad fit of the work when first placed together, and they would see how the economical drift pin is manipulated.

So far as the lateral sway, bracing and strutting of the Springfield bridge are concerned, no data being given, we know nothing about them. But when Mr. Philbrick sees an advantage in riveted connections because of the doing away of the screwing up of lateral rods, etc., I cannot agree with him.

Lateral sway bars in European lattice bridges are put in hot, so as to exert *unknown* strains on the iron when cooled down. The screw-connections permit an adjustment, and there is no difficulty in making them permanently strained also if desired. Mr. Philbrick's assertion would simply deny the conclusion of the Association of German Railroad Engineers, quoted in my letter of February 27, according to which the screw bolts of railroad splices have given more satisfaction than any special device, and also than rivets. All that is to be done to prevent screws of lateral rods from getting loose is to use some elastic medium under the nuts, the best permanent contrivance, perhaps, being elastic iron or steel plates or washers.

Instead of being afraid of adjustment of lateral sway rods of pin bridges, it would be well to take proper precautions in riveted floors for preventing the rivets from getting loose, which, according to two instances quoted in my letter of February 27, may be expected. This end may be achieved by placing a *sufficient* volume of elastic timber between rails and riveted cross-bearers and stringers.

Mr. Philbrick not having heard of a riveted bridge ever having tumbled down, his attention is called to two riveted structures which failed in Peru lately, one of which was successfully replaced by an American pin and link bridge.

Even the best plan can be murdered in the design of the details and in their execution; quotations of failures of bridges therefore should be accompanied by reliable facts concerning the causes of the failures.

It is not considered fair to quote the Waterbury bridge when it is *known* that its falling down under test was due to bad execution in material and workmanship of a bottom link made by a manufacturing party which since has failed, and has been reported as unreliable. The same bridge, as far as I know, re-erected with hydraulic upset double-refined Phœnix links, has stood thorough tests, inspections and use.

It can no longer surprise us that the Crumlin viaduct in England was also quoted by Mr. Philbrick as testimony in favor of his preferred design. The pins of this viaduct, as originally designed, were proportioned in accordance with the very same delusive experiments on which was based the assumption that riveted plate girders, after deduction of loss by rivet holes, can be calculated as if made of one piece, and that riveted structures in general form the height of perfection of bridge work.

According to those delusive experiments, the bearings of rivets were strained to about twice or 2⅛ times the maximum specified strain. When those rules were applied to pins, without the essential head friction accompanying experimental rivet joints, of course a speedy wearing out could justly be expected.

On the contrary, this very example proves, if anything, surely that we must pay all possible attention to the details, and must not get over difficult questions by generalities, or by reliance on the plasticity of iron. In the Crumlin viaduct, 8 in. bars were connected only by 3⅛ in. pins, when 6¼ in. should have been a minimum for the top chords. If I am not mistaken, there are bridges in this country also, of old designs, with equally small pins, with very little or no workmanship about them. In England and in Germany there are some pin-jointed bridges suffering from the same fault. It would be astonishing if they were to stand long. I do not deny that with the factor of safety used at present, lattice bridges like the one at Springfield may stand longer than we live; but why not strain properly designed bridges higher, when high strains at the joints of lattice bridges do no harm?

This is precisely what Mr. Woehler, the distinguished experimenter and expert in such matters, has arrived at when he comes to the conclusion that we can strain iron bridges higher than we do at present. But this authority, writing in the year 1866 (*Zeitschrift fuer Bauwesen*, Berlin), also adds: "*Of course as long as in our calculations we suppose the various members to be hinged, while we actually rivet them rigidly together, we cannot know what strains exist therein.*" When Mr. Philbrick has found the elastic limits of angles for the Springfield bridge to be 30,000 lbs., this only proves that the testing machine which was at his disposal is of ordinary construction, for the very best high quality of iron under proper testing apparatus shows permanent sets under strains of 5,000 lbs. per square inch, and proves very regular increases of these sets when the strains are increased.

The ultimate strength of the tested iron, finally, is no sufficient criterion for its quality.

What Mr. Philbrick further says in his letter of March 20 refers to the cost of the Springfield bridge. In regard to this *commercial* success, I merely answer from what I have learned about the achievement of this result. It will be well not to be too proud of it.

Mr. Philbrick further knows well that when I have mentioned that we need not go to Boston for the theory of lattice bridges, only that theory was alluded to of which his letter of March 20 has given us an example. I have certainly not referred to Bostonian engineers going West, since this point was not one of the questions before us; nor could it have been either my own or Mr. Kramer's intention to furnish professional advice, since neither of us has an interest in this regard, and it is not I who furnishes bridge and plans for execution, nor do I place myself as middle man between the consumer and bridge engineer by profession.

The present low price of common plate and angle iron in this country is very likely to promote the inauguration of an era of riveted patchwork, more especially since anybody who hires an old boiler shop containing a second-hand engine, a shaky punch, a couple of hand-forges with a number of hammers and a full supply of drift pins can start "Lattice Bridge Building Works."

It is therefore considered useful to clearly show the real value of second-class work when compared with the best practice of that highly-perfected system for static constructions which has been brought to honor by first-class bridge-building firms of this country.

CH. BENDER, C. E.

English and American Technical Societies.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It may possibly be instructive to those who are interested in the subject of car wheels to compare the discussions held before the Master Car-Builders' Association in America and the Institution of Civil Engineers in England on that subject.

The following extracts are taken from your journal of Dec. 26, 1874, and that of Feb. 27, 1875:

Mr. Washburne, a veteran wheel manufacturer, states to the car-builders that a steel wheel will run longer than an iron one in the proportion of six to one. An iron wheel must be a good one to average 40,000 miles. Mr. Fox states to the English engineers that chilled iron wheels are safer than steel wheels, and that they outlive steel ones in the proportion of about 3 to 1, also that chilled wheels average at least 100,000 miles.

Mr. Scoville, a wheel manufacturer, tells the car-builders that he does not think he ever made engine truck wheels to average 50,000 miles, and thinks a maker who undertook to do so would have a bad job on his hands.

Mr. Phipps and Mr. Ferrier, English engineers, thought the chilled wheels were safer than the steel ones, being less liable to break.

Mr. Adams, an experienced car-builder, told the car-builders he thought they got about one good chilled wheel to three bad ones.

Mr. Davenport and Mr. Snow, eminent wheel manufacturers, gave 57,000 and 59,000 miles as the mileage for wheels under passenger cars, and said these statements were based on actual figures taken from the books of different railroads.

Mr. Starbuck told the English engineers that cast-iron wheels would stand in the coldest climates and would run 100,000 miles, and no authority put it less than 75,000.

Mr. Chamberlain, a well-known master car-builder, gave to the American Society the mileage of certain lots of wheels of which he had kept account. One lot of 588 averaged 32,606 miles per wheel; another lot of 1,682 passenger car 33 inch wheels averaged 35,723 miles per wheel; while of 1,800 steel wheels 72 had worn out with an average mileage of 79,562 miles; the rest were still running; one pair had made 320,388 miles and were apparently good for as much more. The lot were guaranteed to run 100,000 miles per wheel.

Two things are very striking in comparing the discussions before the two societies. On the one hand the sound, clear-headed, practical good sense of the master car-builders and the extreme modesty and fairness of the various wheel manufacturers in dealing with this question, and on the other hand the vague and distorted ideas brought before the institution in England.

It would be well if those who are apt to decry the associations of our master mechanics and master car-builders and to reserve all their admiration for foreign scientific societies would compare the above-mentioned discussions, and they will find, I think, that we have no reason to be ashamed of the comparison.

H. F.

"The Abominable Cast-Iron Cross-Head"

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am an abominable cast-iron cross-head, that's what I am—always breaking down, always hard to keep in order, always costly to make, and sure to be the first thing looked at after I get a chance to stand still over night. That's what I am, or else why am I abominable? I don't see why such a bad name should be thrust upon me. Don't I do my part as well as the cast-iron wheels that they talk so strongly about? Do I wear out any faster than they do? Have I ever thrown any more trains off the track than they have? Do I have to be rapped with a hammer every fifty miles to see whether I can wag a little longer? I know one thing, and that is if they would put as good iron into me as they have to put into the cast-iron wheel, and would be sure to crowd it in hard with a long neck and fill me up full, they wouldn't call me abominable one-half as much as they do. Why don't they talk about the extravagant wrought-iron cross-head of the English engine? Does that cost any less than I do? Has it got any fewer parts in it? Will it stand any longer than I can the wagging back and forth that we both have to do so much of? I tell you, Mr. Editor, that even if I am so abominable, I am worth all they pay for me, and can do as much for my money as any of the rest of them.

I am sadly yours,

A MUCH ABUSED CROSS-HEAD.

The Siemens & Halske Block Signal Apparatus.

Mr. F. Defarge, a Belgian railroad engineer, in a paper read before a Belgian engineers' society, described as follows this apparatus which seems to be generally applied in Germany:

The general arrangement of Siemens & Halske's apparatus is the following:

Let there be three posts, A, B, C. Each has a two-armed semaphore, with a lantern, comprising a cast-iron box pierced with two windows, before each of which is a disc. One of the discs and one of the arms of the semaphore correspond with the course of the trains in one direction, and the two others to their course in an inverse direction.

The cast-iron case being generally placed in the hut of the track guard, the engine drivers have only to attend to the position of the arms of the semaphore. Each of the discs appear in red or white, according as the line is clear or blocked.

Shortly before the passage of the train the arms of the semaphores are placed in the position of *line clear*. When the train has passed the post A, it puts its semaphore at *stop*, and its disc at red. The train then is covered. Having arrived at B, and passed the semaphore at this post, the latter acts in like manner at A, and by the maneuvre which it executes to bring back its own disc to red, it sends out currents which change A's red disc into white. A second train can then start from A towards B. The first train having arrived at C, this last, as we have just said, brings the red disc of B to white, etc., etc. The guarantees for security which these apparatus give are the result of the following arrangements:

1. The movements of the discs are caused by currents of induction, alternately positive and negative; a contact between the aerial thread which does the office of these apparatus, and an ordinary telegraphic wire, has no influence on this movement. It is the same with discharges of atmospheric electricity (a storm, etc.).

2. No post can send currents which bring to white the disc of the preceding post, without having put its semaphore to *stop*.

No post, A for example, can make its semaphore pass from the position of *stop* to that of *clear*, before the next post, B, has announced the arrival of the train, by changing into white, as has been said, the red disc of A. Any post can make its disc pass from white to red, but it cannot change its red disc to

white, and it cannot change its position of *stop*, by the arms of the semaphore, as long as its own disc is red. It results, then, from the above two points, that it is only the post where the train has arrived which can clear the way for the preceding post, and that it can only perform this maneuvre after having itself covered the train. The conclusion of this is that *each train is necessarily always covered by the semaphore of a post.* This capital advantage constitutes the superiority of Siemen's apparatus over those used in England. In the latter there is no solidarity between the semaphores which command the line and the apparatus which receive the electric signals, nor between the apparatus of the different posts. It follows that any negligence on the part of those whose duty it is to work them, may be attended with serious consequences.

In the apparatus which he makes now, Mr. Siemens affixes a commutator, which permits, when the train is in sight, to announce the fact to the following post, by means of the same line wire, and a small special bell. Besides, a second ring of a bell placed in the interior of the cast-metal case acts every time the discs are put in movement, by electric currents. Siemens & Halske's apparatus are well made. According to the engineers on the lines where they are used, their working is regular, they are little subject to derangement, and are maintained at small cost. When one ceases to work, from a rupture of a wire, or from any other cause, the service is performed on a defective section, unless other means of communication are adopted, in a manner analogous to what takes place now on our lines.

The expenses of fitting-up vary with the local conditions of each line.

In Belgium, on the section from Melle to Ostend, they amount on an average to $240 per mile, all expenses of furnishing and workmanship included. On the open line, the sections will consist of about two miles. For a system of about 625 kilometres, the entire cost of fitting would be $240,000. The annual cost of interest and sinking-fund of this sum may be fixed at $15,000, allowing an average duration of thirty years for the apparatus, semaphores, etc. It is sufficient that a few collisions be avoided, in order that the expenses of the apparatus may be abundantly covered. In fact, the damage arising out of an accident may easily amount to from $6,000 to $8,000, without counting the indemnities to be paid to the families of the victims.

Tests of American Iron and Steel.

A general order just issued from the War Department announces the names of the members of the board to conduct the experiments in testing iron and steel under section 4 of the Sundry Civil Appropriation bill, approved March 3, 1875. It is directed by the President that the board will convene at the Watertown Arsenal, Massachusetts, on April 15, 1875, or as soon thereafter as practicable, for the purpose of determining by actual tests the strength and value of all kinds of iron, steel, and other metals which may be submitted to them or by them procured, and to prepare tables which will exhibit the strength and value of said materials for constructive and mechanical purposes, and to provide for the building of a suitable machine for establishing such tests, the machine to be set up and maintained at the Watertown Arsenal. The funds appropriated for the purposes of these tests will be disbursed under the Ordnance Department of the Army, and the board will receive its instructions from, and make its report to, the Chief of Ordnance. Mr. R. H. Thurston is designated as Secretary of the board at an annual compensation of $1,200. Actual traveling expenses as provided by law will be allowed the members of the board. The board to conduct the experiments consists of Lieut. Col. T. T. S. Laidley, Ordnance Department, United States Army, President; Commander L. A. Beardslee, United States Navy; Lieut. Col. Q. A. Gilmore, Engineer Department, United States Army; David Smith, Chief Engineer, United States Navy; W. Sooy Smith, Civil Engineer; A. L. Holley, Civil Engineer, and R. H. Thurston, Civil Engineer.

The army and navy thus have four of the seven members. The civilians are all eminent engineers. General Smith, though best known perhaps as a cavalry officer, was an officer of engineers before the war, and since has been engaged in the construction of some of the greatest Western bridges. Mr. Holley is best known for his machinery used in the Bessemer process, and is one of the best known of American engineers. Professor Thurston was formerly in the navy, and has made a special study of tests of materials for some years. The Commission has, we believe, $75,000 to expend, and its composition and resources promise some good results.

The Master Mechanics' Association.

The eighth annual meeting of this Association, will convene at the Cooper Institute in the city of New York, May 11, 1875, at 9 a. m.

Hotel headquarters for members and their families have been secured at the St. Nicholas, at reasonable specified rates. Full particulars given on application to the Committee of Arrangements.

Members will please notify the Chairman as early as possible of their intention to be present, those accompanied by their families should state the number of rooms desired, and the kind of accommodations required.

H. G. BROOKS, Dunkirk, New York.
W. M. STRONG, 42d st. and 4th ave., New York.
J. VAN VECHTEN, Port Jervis, New York.
Committee.

Address H. G. BROOKS, Brooks' Locomotive Works, Dunkirk, New York.

THE SCRAP HEAP.

Hall's Automatic Electric Railway Signal.

The Hall Railway Signal Company has had recently on exhibition at the Erie Building, in New York, a set of its automatic signals, in charge of Mr. Thomas Hall, the inventor, who is the General Manager of the company. The set comprises full-sized track, switch and station signals, with models of the road-crossing and draw-bridge signals, illustrating, as completely as can be done in such a manner, Mr. Hall's system. The general arrangement and construction of these signals was set forth in a paper published in the *Railroad Gazette* of February 13, and we shall probably give a more detailed description of the system hereafter.

We are informed that the system, which has already been in use on the Eastern road, is now being introduced on the Boston & Lowell and that a contract has been closed with the Boston & Albany for the full equipment of the road from Boston to Worcester, 44 miles, with these signals. That section of road, upon which there is a very heavy traffic, will be worked on Mr. Hall's system and will certainly afford a very full test of its merits. The company is also in treaty with the New York, New Haven & Harford for the introduction of the signals on that road, and will probably furnish them for the whole line from New York to Boston.

Mr. Hall has labored, and he thinks with success, to eliminate the element of human fallibility and mistake, and nothing is left to depend on the operator, the only possibility of error being with the engineman, and in his case only extreme carelessness can cause any accident.

A New Refrigerator Car.

The Hartford (Conn.) *Courant* says: "A refrigerator car has just been made at the New Haven car shops on the plan of Allegretti's 'iceberg car.' The interior of the car is lined to the thickness of an inch with heavy hair felt, over which is another lining of tarred paper. This being enclosed with boards, a space is left of about five inches for the reception of the ice, which is placed here through holes at the top. The whole is sheathed at the bottom, at the sides and overhead with galvanized iron, and shelves are arranged for the reception of fruit, for the transportation of which the car was especially designed. Hot air is ejected from the car through small pipes at the top, and the water of the melted ice is drawn off in a manner equally ingenious. The car is to be first used in bringing strawberries from the South."

LOCOMOTIVE RETURNS, NOVEMBER, 1874.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

NAME OF ROAD.	Number of miles operated	Number of Locomotives in service	Mileage	No. Miles run to Ton of Coal	No. Miles run to Cord of Wood	No. Miles run to Pint of Oil	Av'rage No. of Freight Cars Hauled	Cost per Mile in Cents for Repairs	Fuel	Stores	Miscellaneous	Engine'rs, firemen and wipers	Total	Av'ge cost of Coal, per ton	Wood, per cord
Atlantic & Great Western (First & Second Div.)	228	80	186,808	41.53	.....	17.32	.....	5.87	6 12	0.59	0.91	6 46	19.45	$2.38	$3.22
" " " (Third & Fourth Div.)	203	50	100,737	41.53	.....	20.48	.....	5.53	6 12	0.48	0.94	6.06	19.13	2.38	3.22
" " " (Mahoning Division)	113	58	126,846	41.53	.....	20.51	.....	3.47	6.12	0.43	0.61	5.92	16.55	2.38	3.22
" " " (Shenango & Allegheny)	33	9	12,735	65.98	.....	29.27	.. ..	5.71	3.03	6.30	1.12	6.13	6.29	2.00	.....
California Pacific	148	12	32,703	58.33	82.92	22.84	.. ..	3.49	12.50	0.55	0.53	6.70	23.77	7.75	5.50
Central Pacific (Western Division)	173.4	44	116,535	37.99	.....	15.16	.....	8.04	20.82	0.9	0.58	7.70	38.04	7.57	4.81
" " (Sacramento Division)	119.5	42	99,095	.....	49.34	18.24	.....	9.71	16.63	0.90	0.96	8.49	36.09	.....	4.81
" " (Truckee Division)	204.5	27	67,128	32.52	29.13	15.21	.....	9.74	19.56	0.77	0.71	8 78	39 51	7.57	4.81
" " (Humboldt Division)	236.6	22	59 823	34.64	.....	16.61	.....	3.81	20.93	0.69	0.52	7.73	33.68	7.57	4.81
" " (Salt Lake Division)	182.8	24	68,284	35.97	.....	14.82	.....	7 10	20.16	0 83	0.44	7.64	36.17	7.57	4.81
" " (Oregon Division)	151.48	6	19,580	.....	40.29	22.51	.. ..	5.57	11.94	0.68	0.65	7.13	25.97	.....	4 81
" " (Visalia Division)	188.3	12	32,418	45.54	50.00	16.63	.. ..	5.85	17.12	0.79	0.37	7.53	31.66	7.57	4.81
Chicago, Burlington & Quincy	126.4	300	678,329	33.51	.....	13.32	18.85	5 35	8.27	0.62	.....	7.91	22.15	2.70	4.25
Chicago, Rock Island & Pacific (Illinois Div.)	....	90	190,775	34.45	.....	17.00	.....	4 33	7.79	0.50	.....	7.13	19.75	2.60	3.80
" " (Iowa Division)	.....	73	176,339	30 35	.....	15.07	.....	2.81	8.82	0.54	.....	6 76	18.93	2.60	3.80
" " (Southwestern Div.)	.....	51	130,633	33.17	.....	12.66	.....	3.91	8.07	0.63	.....	6 30	18.91	2.60	3.80
Cleve., Col., Cin. & Ind. (Columbus Div.)	138	57	141,309	42.44	41.51	39.62	.....	3.91	7.13	0 56	.....	7.07	18.67	2.80	3.50
" " " (Indianapolis Div.)	207	65	189,600	36.35	50.41	27.51	.....	3.38	7.75	0.60	.....	7.10	18.83	2.74	3.50
" " " (Cincinnati Div.)	130	28	74,421	34 41	.....	28.80	.....	2.81	6 79	0.52	.....	7.52	17.64	2.18	3.50
Cleveland & Pittsburgh	.....	83	147,258	53.76	.....	17.83	.....	4.80	4.27	0.73	.....	7.23	17.03	2.00	1.95
Del., Lacka. & West. (Bloomsburg Div.)	80	23	50,185	37.17	.....	23.04	.....	6.42	5.70	0.90	.....	6.71	19.73	.....	.....
Denver Pacific	.....	....	14,412	48.09	.....	13.89	.....	0.69	7.34	0.49	....	6 48	15.00	3.50	7.72
Flint & Pere Marquette	..	....	91,270	.....	54.45	28.04	.. ..	3.66	8.30	0.58	.....	6.28	18.82	.....	4.80
Hannibal & St. Joseph	.....	62	135,960	37.10	.....	13.80	.. ..	5.40	8.60	0.50	.....	7.10	21.60	3.00	5.00
Illinois Central (Chicago Division)	252.5	64	158,259	36.27	....	14.47	18.23	5.47	5.57	0.37	.....	6.92	18 35	1.90	4.35
" " (South Division)	230.75	35	74,578	34.16	.....	13.60	18.85	6.26	5.87	0.43	....	6 66	19.22	1.90	4.35
" " (North Division)	225	42	95,379	30.36	.....	13.10	17.10	7.82	6 59	0.43	.....	6 75	21.59	1.90	4.35
" " (Iowa Division)	401	42	98,806	31.40	.....	16.13	13.46	3.87	7.67	0.38	.....	6.53	18.45	2.30	5.25
Indianapolis, Bloomington & Western	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jeffersonville, Madison & Indianapolis	225	43	104,395	36.46	34.92	16.50	.....	2.95	8.25	0.53	1.90	6 76	20.39	2.84	3.32
Kansas Pacific	.....	..	176 293	34.91	.....	12.96	.....	4.15	10.27	0.51	.....	6.63	21.56	3.50	4.45
Kansas City, St. Joseph & Council Bluffs*	.....	25	66,163	38.30	.....	15.00	16.90	5.10	8.40	0.60	.....	7.70	21.80	3.50	4.50
Lake Shore & Michigan South. (Buffalo Div.)†	.....	93	176,658	46.63	40.50	15 92	.....	4.39	8.61	.....	.....	6 64	19 64	3.50	5.30
" " (Erie Div.)†	.....	114	223,412	39.70	57.03	21.02	.. ..	5.57	8.85	.....	.....	6.46	20 88	3.50	4.50
" " (Toledo Div.)†	.....	79	155,135	33.08	53.24	13.44	.. ..	4 85	11.11	.....	.....	6.73	22 69	4.00	4.00
" " (Mich.South. Div.)†	....	211	415,755	34.39	53.20	18.46	.....	4.96	10.79	.....	.....	7.14	22.89	4.50	3.50
Louisville, Cincinnati & Lexington	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leavenworth, Lawrence & Galveston	182.7	16	21,359	50.73	.....	25.43	.....	6.53	7.76	0.42	.....	6.15	20.86	3.62½ per bu.	5.00
Northern Central (Elmira & Canandaigua Div.)	.....	46	84,672	28.46	.....	17.24	.....	6.38	9.61	0.77	.....	6.22	22,98	0.00	3.04
Pennsylvania (New York Division)	119.9	109	247,501	33.72	.....	10.85	.....	7.20	14.50	1.20	.....	.....	22.90	0.17	6.88
" (Amboy Division)	154.2	54	84,519	49.84	.....	14.41	.....	5.40	9.80	0.90	.....	.....	16 10	0.17	6.88
" (Belvidere Division)	102.5	33	66,625	40.00	.....	12.05	.....	4.00	12.10	1.20	.....	.....	17.30	0.17	6 91
" (Philadelphia Division)	204.3	167	357,893	31.88	.....	13.62	.....	3.20	5.61	0.90	.....	.....	9.70	0.06	3.44
" (Middle Division)	131.6	129	278,378	33.04	.....	20.58	.....	4.20	5 30	0.60	.....	.....	10.10	0.06	3.44
" (Pittsburgh Division, East End)	..	66	121 123	21.92	.....	12.44	.....	7.60	7.90	1.00	.....	.....	15.50	0.06	3.44
" (Pittsburgh Division, West End)	....	102	236,707	39.30	.....	13.70	.....	7.50	5.20	0.80	.....	.....	13.50	0.06	3.44
" (Tyrone Division)	100.3	22	41,716	24.68	.....	25.25	.....	3 10	7.50	0.50	.....	.....	11.10	0 06	3.44
" (West Pennsylvania Division)	103.6	25	42 103	44.12	.....	33.11	.....	3.10	4.20	0.40	.....	.....	7.70	0.06	3.44
" (Lewistown Division)	62.5	7	13.159	60 48	.....	20.24	.. ..	16.00	3.10	0 50	.....	.....	19.60	0.06	3.48
" (Bedford Division)	56.5	6	6,782	58.90	.....	24.88	.....	1.10	3.20	0.50	.....	.....	4.80	0.06	3.49
Pitts., Fort Wayne & Chicago (Eastern Div.)	468.9	169	399,874	37.55	.....	14.90	.. ..	3.86	5.80	0.99	0.99	6.67	18.01	per ton. 2.06	2.06
" " " (Western Div.)	280	105	257,753	39.50	.....	16.00	20 50	4.20	6.60	0.60	1.20	6.60	19.20	2.60	2.60
Pitts., Cin. & St. Louis (Little Miami Div.)	.....	38	100,886	41.99	.....	13.22	.....	5.29	5.89	0.88	3.91	7.37	23.34	2.25	3.45
South Carolina	242	37	85 861	.....	41.49	26.88	.....	6.37	6.28	0.72	.....	.....	13.37	.....	2.61
Stockton & Copperopolis	49	3	4,087	.....	66.19	13.49	.....	22.79	7 55	1.07	1.54	9.65	42.60	.....	5.00
St. Joseph & Denver City	226	....	40,468	40 00	....	21.20	.....	3.10	9.90	0.70	....	6 40	20.10	3.75	4.50
Toledo, Peoria & Warsaw	228.5	48	69,738	33.00	....	20 50	.....	6.50	6.20	0.40	.....	6.70	19 80	1.90	3.50
Terre Haute & Indianapolis (year ending Nov. 30)	.....	72	1,668,654	32.80	28.80	19.90	.....	5.96	7.30	0 99	0.51	7.88	22.64	.....	.....

* Three empty cars rated as two loaded ones.

† Switching engines allowed six miles per hour.

The New Pennsylvania Rail Pattern.

It is stated that the Pennsylvania Railroad Company has made a radical change in the standard section for 67 and 60 pound steel rails. The new section has a head with a decidedly angular appearance, nearly flat on the crown, with sides presenting a large and corresponding surface to the wheel flange, and with its weight of metal greatly increased, which (the weight per yard remaining the same) necessarily reduces the area of the neck and flange or base. The width of the flange, moreover is increased. The changes conform pretty nearly to those adopted by the Erie Company.

Improvement in Ticket Forms.

The St. Louis *Railway Register* says: "Mr. T. Penfield, General Ticket Agent of the Hannibal & St. Joe Railroad, has prepared a new ticket form for his road, answering both as a regular ticket and as a round trip ticket. The form below will explain the method adopted, which obviates the necessity of two sets of tickets, usually employed:

HANNIBAL & ST. JOSEPH R. R.
FIRST CLASS.
QUINCY
TO.
HANNIBAL.
12 | AND RETURN. | 12

"By simply perforating the card above the words 'and return' the lower part of the ticket can be torn off by the agent and returned in his report, leaving the regular ticket when not sold for the round trip."

Improvements in Block Signalling.

Messrs. Saxby & Farmer, leading manufacturers of signals in England, in connection with the electrical engineering firm of Tyer & Norman have brought out an improvement which the London *Times* comments on as follows:

"The leading feature of the invention is the employment of electricity to make or break the connection between a railway signal out of doors and the hand lever by which it is worked from within the signalman's cabin. The outside signal is counter-weighted so that when the connection between it and the hand lever is broken it must rise to, or remain at, its danger position. The working of the signal can thus be controlled from any place irrespective of distance. Should the signal have been placed by the local man in the position indicating danger it can be maintained in that position by the distant signalman at pleasure, and the local man cannot alter it to safety. On the other hand, should the signal indicate safety the man at the other end of the section can cause it to rise instantly to the danger position, and he can maintain it there at will. In effect, the signalman at each end has the power individually to signal danger, but the signal for safety can only be given by the concurrent action of both."

Locomotive Improvements.

An English journal says that a M. Mallet has taken out a patent for several improvements which, it is thought, may prove of real advantage. In order to obtain a large furnace without disarranging the balance of the various parts and with the power of placing a driving axle beneath the firebars, the inventor separates the furnace entirely from the cylindrical body of the boiler, the lining of the furnace containing water at a different level from the water in the boiler, while the pressure in the two may also be different in the two parts—more elevated in the boiler, which has greater powers of resistance, and less so in the lining of the boiler. The working parts are much altered; for the inventor adopts two cylinders of different diameters—one with a cut-off—but both being capable of working at full pressure. The small cylinder is fed from the boiler at high pressure and the discharge is made into the lining of the furnace where the pressure is less and whence the steam is taken for the large expansion cylinder. The cylinders are encased in jackets of thin sheet iron and the space is filled by the escape steam superheated in a coil placed in the smoke box to a temperature superior to that of the steam in the boiler.

The National Locomotive Works.

The National Locomotive Works of Dawson & Bailey, at Connellsville, Pa., have been obliged by their increasing business to enlarge their facilities for work by the purchase of a lot of new tools from the Niles Tool Works at Hamilton, O.

The works recently turned out some engines of the "Mogul" pattern for the Cairo & St. Louis road. These engines are of 3-feet gauge and have 14 by 22 inch cylinders and driving wheels 46 inches diameter. One of these engines has hauled 29 ten-ton cars up a grade of 85 feet to the mile, a very excellent performance.

How to Save Money.

In our "Foreign Railroad Notes" of April 3, we noticed an immense saving on a German railroad by improving the lubricating system, but here comes an Elmira paper and tells us that by the use of somebody's lubricator "the saving in operating the rolling stock of roads will exceed 80 per cent. of expense now used." Now we can have cheap transportation.

Civil Engineers' Club of the Northwest.

At the monthly meeting, April 11, papers were to be read by Mr. M. A. A. Meyendorff on "Mineral Surveys," and one by Mr. E. S. Chesbrough on "Some Experiences in Submarine Examinations in Lake Michigan by Captain Peter Falcon."

Navigation by Locomotives.

A passenger on the Nashville & Chattanooga road during the recent flood, says that the cylinders, pistons and connecting rods of the engine were all under water. The engineer piled up wood in the bottom of the fire-box of the locomotive and built a coal fire on top, by means of which he was enabled to keep up steam enough to get through the water; but they had to stop at the foot of the ascending grade and kindle a larger fire. From Stevenson to Bass station they passed in flatboats through water from three to thirty feet deep. In some places the telegraph wires were on a level with their shoulders as they sat in the boat. The Tennessee River in places was 25 miles wide.

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Editorial Announcements.

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

RAILROAD CITY TERMINI.

The transportation charge on production is not always in proportion to distance, even on unbroken rail or water routes, and, where modern methods are employed, the charge may be said to be of two very different kinds—one the commonly recognized charge of the common carrier for receiving, loading, carrying by rail or vessel, unloading and delivering at the end of his route; the other, sometimes not appearing as a transportation charge, but figuring in the shipper's expenses as "commission," "transfer," "cartage," "cooperage," "warehousing," etc., and yet really part of the cost incident to the removal of the goods from the place of production to the place of consumption. And this latter expense is an immense one, and has not been reduced by the introduction of railroads and steamboats to anything like the extent that the other transportation charge has been. It requires the services of great armies of men and horses in every large city; and an investment of capital in buildings and other property which would make a very respectable figure by the side of the cost of railroads even. It offers a field for improvement perhaps not equalled now in the carrying over great distances. For the first branch of transportation of which we speak consists chiefly of the moving of larger bodies of goods over routes that, as prepared, offer few and simple obstacles; the second, of moving such goods, usually in smaller bodies, over short distances against more formidable and perhaps more numerous obstacles. A car or a railroad car, for instance, may carry bricks cheaply enough a considerable distance to the foot of the wall; but if their final destination is at the top of the wall, and the wall is fifty feet high, and it is so situated that the bricks can be got up only by men carrying them in hods, then this last fifty feet of the transportation—for it is nothing else than transportation—may well cost more than the hauling a hundred miles by rail and two or three by carts.

In this country we have succeeded eminently in the art of carrying long distances with reasonable speed, safety and cheapness, as we had need to do because of the great distance much of our productions must go; but in the art of overcoming the difficult short distances, though in some particulars we have succeeded admirably (as in grain elevators, stock yards and coal wharves), we are still far behind some European countries, and especially England, for which reasons may be found as plenty as for our excellence in carrying long distances.

The ideally perfect transportation line would take the passenger or freight at any given point in one city and land it at any point in the place to which it is consigned. Our transportation lines in some instances hardly do more than to receive at the border of one terminus and carry to the border of the other. The merchant may receive his consignment three or four miles from his warehouse or from the point at which it must be re-shipped; and three or four miles of cartage through a crowded city bring us back to the dark ages of transportation, and add immensely to the cost of transferring from producer to consumer.

Cities are among the most serious obstacles to transportation. It appears that the cost of getting grain from a New York railroad terminus, moved in floating elevators, which can reach unobstructed any part of New York harbor, from the cars to the vessel in which it is exported is about one-tenth of the cost of carriage from Chicago to New York, one-fourth of the canal charge last year from Buffalo to New York, and three-fourths of the canal toll over a distance of more than 300 miles. Yet this is perhaps the cheapest imaginable mode of transfer from cars to vessels which cannot come directly to the railroad terminus. For goods that are delivered at one point in New York and must be carted thence to another point for distribution, and again carted for reshipment or to the consumer, the handling after the goods leave the railroad is an enormous expense.

The case of New York is considered quite fully in the part of the report of the Rapid Transit Committee of the American Society of Civil Engineers which we copy this week, "On the Best and Cheapest Methods of Delivering, Storing and Distributing Goods and Freight." The Committee's attention, of course, was confined to the City of New York—a case, indeed, requiring particular attention, since its natural advantages are offset by its neglect to secure modern methods of handling and transferring which competing cities have already adopted. But their study and the further investigation of the subject deserves attention in nearly all American cities; for the facilities for getting traffic to them have far surpassed those for getting it through them or distributing it in them.

It is natural that this should be so. The distinguishing feature of American railroad engineering has been the making of efficient railroads with little money. Now, you can do nothing with a little money in an enterprise requiring much land in a great city. If you buy the land for tracks as well as your stations, you can soon spend enough to make a railroad half-way across the continent; if you do not buy your land (and probably if you do) you must make vast expenditures for tunnels, bridges, viaducts, etc., of which the Fourth Avenue Improvement in New York is an example close at hand.

In England, where capital is abundant, but city property generally not worth much more than it is here (except, perhaps, in the heart of London), as a rule railroads have their stations, both passenger and freight, in the hearts of cities, and in London (and in most other large towns, we think) their connections are such that freight may be consigned to any one of several stations within the city, which enables the merchant to get his goods at the nearest station.

New York, by reason of its form, as a long, narrow island, and its situation, with navigable waters nearly all around it, offers peculiar advantages and disadvantages for the delivery of goods. Its narrowness and its docks on each side enable vessels to approach within a mile of any building on the island. On the other hand, the great channels on the east and west, and the bay on the south, prevent any railroad's finding an entrance into the city except from the north, and the wide Hudson River virtually prevents an entrance in this direction by roads from the south and west, which are the chief carriers of traffic. Again, the elongated form of the island increases the average distance to any single station in it, however central. If the twenty square miles included in a strip of land ten miles long by two wide were in a circular form, a central station would be but 2½ miles from the streets on the boundaries, instead of five, as in the other case; and the St. John's Park station of the New York Central & Hudson River road in New York is no less than seven miles from the Harlem end of the city.

The obstacle presented by the water to the approach of southern and western railroads is not easy to overcome, but is mitigated greatly by transferring cars in boats, and is to some extent and may be to a much greater one by warehousing goods on the Jersey side of the Hudson until needed, and by transferring such as are shipped directly to the vessels, without crossing the Hudson at all.

The form of the island, however, though so unfavorable for the establishment of central stations and railroads in the heart of the city, gives extraordinary advantages to a marginal railroad, such as the committee proposes. With it and the requisite transfer-ferries, the city would have the same advantages for rail that it has for water transportation, and cars as well as vessels could come within a mile of every building on the island.

The Committee's report gives abundant evidence of the formidable character of the terminal expenses at New York. The table appended to it, which we have had to abbreviate greatly, especially deserves study by all who are interested in keeping for New York its position as the commercial center of the country. Whatever improvements may be made in railroad transportation, and however much the cost of carriage may be reduced thereby, New York will fare little better for them, because its competitors will share equally in these advantages. But the terminal expenses must be reduced, if at all, by a local improvement and through local efforts, and in so far as New York is now behind other cities, its advantage by making such improvement will be the greater; and, moreover, the peculiar position which now forms one of the great obstacles to economical distribution, may, as we have said, with such an improvement be turned into an advantage such as scarcely any other Atlantic port can enjoy.

The table appended to the report gives the estimated average present cost per ton of handling each of the different articles of domestic produce that arrive at the city of New York. These expenses vary from $1 for cut meats, oil cake and cotton-seed meal up to $12 for calves, the latter being marketed in New York, driven to abattoirs, and their meat carted thence to butcher shops. The lowest cost is equivalent to transportation by rail a distance of 80 miles at the average rates received by the Pennsylvania Railroad in 1874; the highest to more than the cost of transportation from Chicago to New York at that rate. Flour is reported to cost $2 per ton, wheat $1.30, corn $1.40, cotton $3.20, hides $10, all stock for slaughter except calves $10, sugar $3, petroleum $2, tobacco $3.33, barreled meats $2. The total terminal expense for 1873 is given as $14,200,188, which is an average of $3.07 per ton for the 4,631,700 received—enough to have carried it from Buffalo to Utica on the New York Central at its average rates of last year, or from Pittsburgh to Harrisburg on the Pennsylvania.

In this table only eleven of the articles enumerated equal in weight 1 per cent of the total receipts. Wheat forms 25.4 per cent. of the total, and flour and grain something more than one-half (51.6 per cent.) Live stock form 12.3 per cent., and live stock and their products (meat, lard, hides, wool, butter, cheese, etc.), just 20 per cent.

Five leading products form about 93 per cent. of the whole, as follows:

Flour and grain	51½ per cent.
Stock and stock products	20 "
Petroleum	13½ "
Cotton	4¾ "
Tobacco	3¼ "
Total	93 per cent.

So far as bulk is concerned, the others are unimportant, and with these five provided for the rest would cause very little trouble—indeed, would doubtless themselves be mostly provided for.

Of the entire receipts of 4,631,700 tons, the route of arrival, whether by land or water, is indicated for just about three-quarters—3,445,682 tons. Of this, 2,067,639 tons were received by rail—61 per cent. But of the other articles whose route of arrival is not indicated, very nearly all, except cotton and naval stores, must have arrived by rail.

The reader, however, must not take this as a statement of the total freight handled in New York harbor. It only assumes to be a statement of the receipts of "domestic produce," and the report calls special attention to its incompleteness and laments the impossibility of collecting statistics of the total traffic. Thus there is no statement of coal receipts, which are larger than any one class of those in the table, none of iron, and none of merchandise and manufactured goods that have gone through anything more than the simplest process of manufacture—such as that of cattle into meat, grain into flour and whiskey, seeds and fat into oil, etc.; and none of any kind of building materials. The articles in the table, indeed, form but a fraction of the freight handled at the port of New York, and the $14,200,000 estimated cost of handling must be swelled by other millions for the terminal expenses of these other articles. Yet this amount is greater than the net earnings of the New York Central & Hudson River Railroad for any year, and about the same as the net earnings of the 1,520 miles of line worked by the Pennsylvania Railroad Company in 1874.

Thus it is evident that the terminal tax is a severe one. The facts shown, we believe, make it plain that it can be reduced legitimately much more in proportion than the other transportation tax, and that for the interests of New York its reduction is much more important. New York, however, is but an extreme instance of an imperfection of methods which exists to a great extent in many of our large cities, and which usually can be removed only by a large expenditure of capital and the co-operation of the different railroad companies.

THE UNION PACIFIC.

The circumstances of the Pacific railroads are such that they command much more attention, and, indeed, are really more important, than their traffic would indicate. Constructed by the aid of the Government and attracting during construction the eyes of the world as it were, and now forming the only railroad route across the continent except the little Panama Railroad, which is further off

than San Francisco itself, the route from Omaha to Sacramento is quite as well known as any other in America, probably, and popularly is supposed to be much more important as a carrier of traffic than it really is. Just now the movement in Union Pacific stock makes one of the roads forming the route temporarily more prominent than usual even; and we think we shall be justified in giving here a brief analysis of the operations of the Union Pacific in connection with a review of its annual report for 1874. The President's report was issued some weeks ago, and was published as an advertisement in most of the New York daily papers; but the entire report, with the appendix which gives in detail the figures concerning the traffic, earnings and expenses of the road, was issued later, and has received no attention from the press.

For the years 1873 and 1874 the earnings and expenses were, as heretofore reported:

	1874.	1873.	Inc. or Dec.	P. c.
Earnings	$10,559,880	$10,266,104	Inc...$293,776	2.8
Expenses	4,652,315	4,974,861	Dec.. 322,546	6.5
Net earnings	$5,907,565	$5,291,243	Inc...$616,322	11.6
Earnings per mile	10,232	9,948	284	2.8

These earnings would put the road in the rank of the first-class roads from Chicago westward, with the difference that the Union Pacific is all main line, and the Chicago roads are more than half branches.

The earnings, of course, do not indicate the amount of the traffic. That we find from the report to have been as follows:

Tonnage mileage:	1874.	1873.	Inc. or Dec.	P. c.
Of through freight	139,850,277	97,291,347	Inc..42,558,930	43.7
Of local freight	122,388,560	126,070,195	Dec.. 3,681,635	2.9
Of government freight	10,119,953	9,870,562	Inc.. 3,249,391	47.3
Total	272,358,790	230,232,104	Inc..42,126,686	18.3

The increase is certainly very large, and is the more encouraging from the fact that there was in 1873 an increase of 24.3 per cent. over the tonnage mileage of 1872, and the freight traffic of 1874 is shown to be 47.3 per cent. greater than that of 1872. The Union Pacific can hardly be called a new road, but few new roads have shown a more rapid increase of freight traffic.

Great as is this increase, however, the road cannot yet be said to have a great traffic. Having a length of 1,038 miles, the tonnage mileage per mile of road was 262,388 during the year, while the Chicago, Burlington & Quincy, with earnings per mile during the same year smaller by a tenth, had a freight traffic of 364,243 ton-miles per mile of road, the Michigan Central 807,735 ton-miles on its Main and Air Line, and the New York Central & Hudson River 1,391,560 miles on the whole of its lines, the Pennsylvania Railroad and branches 1,565,233; and on the main line of the Philadelphia & Reading there were 5,459,177 ton-miles per mile of road.

Thus the freight traffic of the Union Pacific, a through line without branches, is less than a twentieth of that of the Reading main line. It is equivalent to 42 full carloads daily each way over the road, for the working days of the year.

The passenger traffic was as follows:

	1874.	1873.	Increase.	P. c.
Passenger mileage, local	24,251,078	18,530,583	5,720,495	30.9
" " through	80,887,128	77,178,471	3,708,657	4.8
Total	105,138,206	95,709,054	9,429,152	9.8

This, too, is a very satisfactory increase, though only about half as great in proportion as the increase in freight traffic. And it also follows a year of increasing traffic, for 1873 exceeded 1872 by no less than 18.8 per cent., and the passenger traffic of 1874 was 30.6 per cent. larger than that of 1872.

This passenger traffic which has grown so rapidly still remains comparatively light, however. It is equivalent to 101,289 passenger-miles per mile of road, which gives 162 passengers each way daily excepting Sundays—enough to fill three ordinary cars full.

Thus we see that the Union Pacific has by no means a heavy traffic—has indeed a light traffic, such as would not support an ordinary Illinois or Iowa railroad, where so many railroads with a light traffic do, however, manage to live. Nevertheless the Union Pacific has large gross earnings and still larger net earnings, and has begun to pay dividends on a very large capital stock.

The strength of its financial position is due almost entirely to the fact that nearly all of its business is not subject to competition, and the company is therefore able to fix its charges as it pleases within the figures which would prevent traffic. The report states the average rate per ton per mile to have been 1.84 cent in 1874, but the division of the total freight earnings by the total tonnage mileage shows it to have been 2.08 cents, or an eighth greater. The freight rate is not a high one, however, the immense distances over which most of this road's traffic must move rendering it impossible to maintain a high rate. Even two cents per ton per mile from Omaha to San Francisco makes a charge of $38 per ton, and not a little of the through freight has to be carried a thousand miles and more in additionto its transit over the Pacific railroads.

With passengers it is different. Many must travel, and the saving of time by the railroad compared with any other route in the case of a large part of the travelers is enough to pay the whole cost of the passage at the rates now charged. The average rate in 1874 was 3.76 cents per mile, which is higher than on most railroads farther east, it is true, yet is exceeded on a great many lines.

The increase in passenger mileage was nearly 10 per cent. during the year under consideration, while the increase in passenger earnings was but 1.6 per cent., and the difference shows that there was a considerable decrease in the average passenger rate. And with freight we have an increase of but 2.7 per cent. in earnings, while the traffic was larger by more than 18 per cent. In the case of freight the reduction was from 2.40 to 2.08 cents per ton per mile, or 13½ per cent.

The road has another advantage in the cheapness with which it can be worked, but this cheapness is doubtless mainly due to the same fact that enables it to fix its charges at high rates—that is the absence of competition. For the cheapness with which the road is worked is due mainly, doubtless, to the very moderate speed with which its trains are run. Its express train travel an average of a little less then twenty miles an hour, its mixed train less than twelve miles, and with only these trains in the way, of course it can scarcely ever be necessary to hurry the freight trains. The speed of trains is a matter of the highest importance as affecting the cost of working a railroad, and the absence of competition enables the Pacific railroads to regulate it as may be most economical. Otherwise the cheapness at which a given amount of traffic is carried would be almost miraculous, considering that the whole amount of traffic is so small. For freight last year it appears to have been 0.936 cent per ton per mile, which is as low a cost as on the New York Central, with its enormous traffic, ever reached until last year.

The only competitor of the Union Pacific has now come under the control of that company. It would be an error, however, to assume that on this account the road becomes free to charge whatever it pleases. As we have said, very much of its traffic cannot be had at all at a high rate, and the maintenance of such charges would doubtless soon greatly diminish the traffic of the road and prevent its future increase. And again, while the Pacific Mail steamers cease to compete, the steamer route from New York to San Francisco remains open to every man who owns a steamer, and if very high rates are maintained and the Pacific Mail does not compete, doubtless very soon we will have vessels that will. The normal growth of the traffic of the Union Pacific, however, under such competition as it has hitherto met, indicates for it a sufficiently prosperous future.

THE PRODUCTION OF ANTHRACITE PIG, according to a correspondent of the New York *Times*, who has been reviewing the condition of the anthracite iron furnaces, has been reduced as follows: In the Lehigh valley out of 53 furnaces 31 are in blast, in the Schuylkill valley 15 out of 42 are in blast, and in the Susquehanna valley 10 out of 24. Of a total of 119 furnaces in the anthracite region 63, or 53 per cent., are out of blast. Probably not all would find a demand for their production if there were no artificial obstacles, but the chief reason for their closing is the impossibility of obtaining coal due to the strikes at the mines. The weakness of the demand for iron is made very plain by the fact that this artificial arrest of production has had so little influence in raising prices. The effect on railroad traffic is great. The anthracite movement in 1874, in spite of the great depression in business, was not very much less than that of 1873; but the returns for the first quarter of this year show a great decrease from 1874, when already there had been a decrease of about 9 per cent. compared with 1873. Nearly all traffic in the mining and smelting districts falls off with the decrease in iron and coal production.

The result, however, though for the moment most unfavorable, may not after all affect very seriously the result of the year's business, provided the strikes do not last; for the reason that during the rest of the season the mines and furnaces can easily produce all that could possibly have been demanded of them if there had been no strike—their capacity for production greatly exceeding any demand that the most sanguine could hope for this year. These strikes and the consequent great fluctuations in anthracite production and traffic occur so frequently that all engaged in the business or affected by it count on them and allow for them in their calculations. They are, according to previous experience, one of the obstacles to production quite as inevitable as water in the mines or the action of the elements on road-beds. They are, doubtless, not really inevitable, but so far they occur so often that they must be taken into account into all calculations of the business and income of coal miners, coal carriers, and great coal consumers. Practically (whoever may be to blame for them) they add a certain percentage to the average cost of fuel, and increase immensely the risks of investments in some of the most important and indispensable industries.

IMMIGRATION continues very light, and, in spite of an increase of about 6 per cent. in the arrivals at New York during the first quarter of 1875, is probably really considerably less than last year. Of the 17,128 passengers who arrived, only 9,058, little more than half, were strictly immigrants—persons arriving for the first time in the United States. Evidently the low steerage rates for a year past, and the lack of profitable employment here, have induced many foreigners to revisit their old homes, for no less than 5,301 of the arrivals were persons who had come to the country before. Business is generally very dull in Europe, and there are plenty of reasons for the workman there to try to better himself; but there is even less demand for his labor here than there, and so he stays at home. Doubtless, unless business revives to an unexpected degree, immigrant traffic will make very little figure in our railroad accounts of 1875, which, if it is to be taken at the rates ruling on the trunk lines last year, will be a good thing for the railroads. With a revival of business, doubtless, we will have a revival of immigration.

MR. ADAMS' RAILROAD LECTURES, delivered at the Lowell Institute last winter were twelve in number, and had the following titles: "George Stephenson and the Rocket;" "The Early Railroads of America;" "Forty-five Years Later;" "The Railroad Revolution;" "Railroad Manias;" "Railroad Accidents;" "Crimes on Railroad Trains;" "Stock Watering;" "The Credit Mobilier;" "'The Grangers';" "The Hoosac Tunnel;" "Forms of Railroad Ownership and their Political Evolution." The last of these, revised for our columns by Mr. Adams and entitled "The Railroad Problem," we published two weeks ago. The one on "The Grangers" appears in the *North American Review* for April. Of the others there has been no publication, we believe, except in the more or less imperfect reports that appeared in the Boston papers as the lectures were delivered.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Cincinnati, Richmond & Fort Wayne.—At the annual meeting in Richmond, Ind., April 1, the following directors were chosen: Wm. Parry, A. F. Scott, J. H. Moorman, Elwood Patterson, Charles F. Coffin, Richmond, Ind.; Gen. A. Stone, Winchester, Ind.; A. McKew, Ridgeville, Ind.; J. Studebaker, Decatur, Ind.; Pliny Hoagland, Fort Wayne, Ind.; J. N. McCullough, Pittsburgh, Pa.; F. H. Short, Cincinnati.

Maine Central.—The board of directors has revived the office of General Manager and appointed to that position Mr. Charles F. Hatch, who retired a short time since. Mr. Payson Tucker, formerly of the Boston & Maine and later of the Eastern, was appointed Superintendent. There are rumors of many other changes.

Northern Railroad of the United States of Colombia.—Messrs. D. de Castro & Co. have been appointed agents for this road in the United States. Their office is at No. 25 William street New York.

Chicago & Alton.—Mr. William Marley, formerly Chief Train Dispatcher, has been appointed Assistant Superintendent, in place of C. H. Seaver, who recently resigned on account of ill health, and has since died.

Toledo, Peoria & Warsaw.—Mr. A. L. Hopkins, the Receiver, will hereafter act as Superintendent in place of W. H Cruger, resigned.

Kentucky & Great Eastern.—The new board of directors has elected the following officers: President, Gen. A. J. Warner, Marietta, O.; Vice President and General Manager, Maj. John Byrne, Cincinnati; Secretary, Thomas Wrightson, Newport, Ky.

Michigan Lake Shore.—At a special meeting held in Grand Rapids, Mich., March 25, the following directors were chosen: Joseph Fisk, A. J. Kellogg, Allegan, Mich.; E. P. Ferry, Grand Haven, Mich.; Thomas D. Messler, Wm. Thaw, J. N. McCullough, Pittsburgh, Pa.; Thomas A. Scott, Philadelphia; G. W. Cass, S. J. Tilden, New York.

Toledo, Peoria & Warsaw.—Mr. W. R. Crumpton, late of the Chicago, Burlington & Quincy, has been appointed General Western Agent, with headquarters in Burlington, Ia.

New Jersey Midland.—On application of the first mortgage bondholders, the Chancellor of New Jersey has appointed Garret A. Hobart and James W. McCulloch, Receivers. Mr. Hobart is the Receiver already appointed by the Chancellor in a suit for payment of overdue coupons.

Denver, South Park and Pacific.—The officers of this company are as follows: John Evans, President; W. S. Cheeseman, Vice-President; G. W. Kassler, Secretary; C. B. Kountz, Treasurer; B. M. Hughes, Attorney; Chas. Wheeler, Auditor; L. H. Eicholtz, Chief Engineer; B. M. Gilman, Superintendent; A. S. Hughes, General Freight Agent. The offices are at Denver, Col.

Pacific, of Missouri.—At the annual meeting in St. Louis, March 29, the following gentlemen were elected directors: T. B. Edgar, W. M. Samuel, E. O. Stanard, J. J. Taussig and Jas. E. Yeatman. At a subsequent meeting of the board Mr. Samuel Hays was chosen President and James E. Yeatman Vice-President, in place of D. R. Garrison and Andrew Peirce, Jr., who declined serving longer. Mr. J. L. Dearborn was chosen Secretary and Treasurer, and James Baker, Attorney.

Detroit, Eel River & Illinois.—Mr. J. C. Hadley has been appointed Superintendent of Track. He was formerly connected with the Logansport, Crawfordsville & Southwestern.

Minneapolis, St. Paul & Iowa.—The first board of directors is as follows: J. B. Bassett, C. M. Loring, S. E. Neiler, Minneapolis, Minn.; L. Z. Rogers, Waterville, Minn.; W. W. Walker, J. W. Traer, John F. Ely, George Douglass, Cedar Rapids, Ia. The last four are connected with the Burlington, Cedar Rapids & Minnesota.

Missouri Railroad Commissioners.—The Governor of Missouri has appointed as the board of Railroad Commissioners, Henry Spaunhorst of St. Louis, Henry C. Young of Springfield, and John Walker of Howard County. Of these Mr. Spaunhorst is President of the Association which publishes the *Amerika*, a German paper in St. Louis; Colonel Young is a lawyer of considerable practice and was at one time attorney for the projected St. Louis & Mexican Gulf road, and Mr. Walker is a wealthy farmer and prominent Granger.

Poughkeepsie Bridge Company.—H. A. Nelson and J. O. Whitehouse have been chosen directors in place of Strickland Kneass and David Salomon, resigned.

Lake Erie, Evansville & Southwestern.—At the annual meeting, April 1, the following directors were chosen: Samuel Bayard, Thomas E. Garvin, Matt. Henning, Robert Pattison, Evansville, Ind.; Will. Cumback, Greensburgh, Ind.; A. Haines, Sr., Eaton, O.; W. H. H. Dye, Troy, O.; J. N. McBeth, Bellefontaine, O.; H. B. Hanson, Saratoga, N. Y.; George T. M. Davis, N. H. Decker, George H. Ellery, T. Henry Mason, New York. The board elected officers as follows: President, George H. Ellery; Vice-President, Robert Pattison; Secretary, Wm. F. Ward, New York; Assistant Secretary, Wm. S. Ford, Evansville, Ind.; Treasurer, W. Hart Smith, New York; Chief Engineer, John H. Bliss, Seymour, Ind.

Panama.—At the annual meeting in New York, April 5, the following directors were chosen: H. H. Baxter, John M. Burke, Wm. Butler Duncan, H. C. Emmott, George J. Forrest, Charles G. Francklyn, C. K. Garrison, J. G. McCullough, John R. Marshall, S. C. Thompson, Frank Work, New York; Trenor W. Park, Bennington, Vt.; John P. Jones, Virginia City, Nev.

The board has elected Trenor W. Park, President; J. McCullough, Vice-President; W. J. Emmett, Secretary and Treasurer.

Chicago & Alton.—At the annual meeting in Chicago, April 5, the following directors, whose terms had expired, were re-elected for three years: George Straut, Peoria, Ill.; John A. Stewart, New York; John F. Slater, Norwich, Conn. The board re-elected T. B. Blackstone, President, and chose the following Executive Committee: T. B. Blackstone, John Crerar, John B. Drake, J. J. Mitchell, George Straut.

Second Avenue.—At the annual meeting in New York, April 5, the following directors were chosen: T. W. Decker, James Everard, James D. Fish, Adolphus Hamilton, Waldo Hutchins, David J. King, Thomas J. McCahill, Moses Mehrbach, Solomon Mehrbach, Wm. Richardson, C. Schwarzwaelder, Wm. S. Thorn, Julius Wadsworth.

Eastern.—Mr. J. B. Whitney, Roadmaster, has been transferred from the Fourth to the First Division, with headquarters at Somerville, Mass., to take the place of Dana Z. Smith, resigned. Mr. Edward Leavitt has been appointed Roadmaster on the Fourth Division.

Logansport, Crawfordsville & Southwestern.—Mr. A. N. Leitnaker, late Master of Transportation, has been appointed Assistant Superintendent, and Mr. W. G. Brimson Master of Transportation. Mr. Brimson has been Train Dispatcher on the Toledo Division of the Lake Shore & Michigan Southern.

Centennial Bureau of Transportation.—Mr. Dolphus Torrey, Superintendent of the Pullman Palace Car Company for the division which includes the Pennsylvania and its allied roads, and Superintendent of the Woodruff sleeping-car line before it was absorbed by the Pullman Company, has been appointed chief of the Bureau of Transportation of the United States Centennial Commission. The duties of the Bureau are summarized as follows: "Foreign transportation for goods and visitors; transportation for goods and visitors in the United States; local transportation; warehousing and customs regulations." Mr. Torrey will have to negotiate with transportation lines to secure the greatest possible facilities for carrying and transferring travelers and goods coming to and going from the Exposition, within the city as well as outside of it, and make the existence and method of using these facilities as plain as possible to all who may wish to visit it. This is a work of great importance to the success of the Exposition, and one for which Mr. Torrey has exceptional qualifications.

Great Western of Canada.—Mr. Charles Percy, of the Secretary's Department of the Railway Clearing House in London, has received the appointment of Assistant Manager and Treasurer. He has been for 15 years in the service of the Clearing House, and for some time Secretary of the English and Scotch Traffic Conference, and is reported to have the general confidence and esteem of English railroad men.

PERSONAL.

—Mr. G. A. Hobart, Receiver of the New Jersey Midland Railroad, was thrown from his carriage in Paterson, April 2, and had an ankle dislocated, besides receiving some severe bruises.

—Mr. C. H. Seaver, Assistant Superintendent of the Chicago & Alton Railroad, died at his residence in Chicago, March 31, after a long illness. He was a well-known railroad man and was highly esteemed.

—Mr. William Hoge, President of the St. Louis, Kansas City & Northern Railway Company and a member of the banking house of Wm. Hoge & Co., of New York, died in St. Louis, April 3.

—Gen. George Stark has resigned his position as Manager of the Boston & Lowell and Lowell & Nashua railroads, after a service of 22 years. A disagreement with the board of directors is said to be the cause of his retirement.

—Mr. John W. Garrett, President of the Baltimore & Ohio Company, arrived in Baltimore April 3, on his return from his Southern trip. Mr. Keyser, the Second Vice-President, is now in Florida for the benefit of his health.

TRAFFIC AND EARNINGS.

Grain Movement.

Foreign exports of breadstuffs from the United States September 1 to March 30 at New York, March 27 at Boston, Philadelphia and Baltimore, and March 18 at San Francisco and other parts were:

	1874-75.	1873-74.	Decrease.	P. c.
Flour, bbls	636,471	988,760	352,289	35.3
Wheat, bush	31,796,699	35,663,540	3,866,841	10.8
Corn, bush	10,122,362	13,044,635	2,922,273	22 5
* Total	44,782,181	53,157,595	8,375,414	15.8

* Flour reduced to wheat on the basis of 4½ bushels per barrel.

Wheat—	1875.	1874.	Inc. or Dec.	P. c.
Week ending March 27:				
Lake ports' receipts	629,649	619,146	Inc... 10,503	1 7
Lake ports' shipments	363,768	393 637	Dec.. 29,869	7.6
Atlantic ports' receipts	504,781	429,690	Inc... 75,091	17.5
Jan 1 to March 27:				
Lake ports' receipts	8,828,777	16,927,630	Dec.. 8,098,853	47.9
Lake ports' shipments	3,109,171	7,851,199	Dec.. 4,642,028	59.1
Atlantic ports' receipts	3,869,955	9,596,815	Dec.. 5,726,860	59.6
Aug. 1 to March 27:				
Lake ports' receipts	43,359,513	58,262,605	Dec..14,903,092	25.6
Flour—	1875.	1874.	Decrease.	P. c.
Week ending March 27:				
Lake ports' receipts	87,409	106,256	18,847	17.8
Lake ports' shipments	88,368	101,604	13,236	13.0
Atlantic ports' receipts	138,504	157,039	18,535	11 8
Jan. 1 to March 27:				
Lake ports' receipts	942,348	1,546,942	604,594	39.1
Lake ports' shipments	947,370	1,386,034	438,664	31.7
Atlantic ports' receipts	1,785,809	2,636,750	850,941	32.3
Aug. 1 to March 27:				
Lake ports' receipts	3,496,328	4,216,100	719,772	17.1
Grain of all Kinds—	1875.	1874.	Inc. or Dec.	P. c
Week ending March 27:				
Lake ports' receipts	1,397,955	1,849,558	Dec.. 451,603	24.4
Lake ports' shipments	1,087,241	1,018,655	Inc... 68,586	6.7
Atlantic ports' receipts	1,727,392	1,364,708	Inc... 362,684	26.6
Jan. 1 to March 27:				
Lake ports' receipts	23,935,444	31,887,259	Dec 7,951,815	24.9
Lake ports' shipments	10,489,339	13,709,852	Dec.. 3,220.513	30.8
Atlantic ports' receipts	21,061,404	22,748,481	Dec.. 1,687,077	7.4
Aug. 1 to March 27:				
Lake ports' receipts	93,723,406	117,966,698	Dec..24,243,292	20.5

In the last table it is noticeable that the Atlantic ports' receipts since January 1 this year have decreased but about half as much as the lake ports' shipments, and little more than one-fifth as much as the lake ports' receipts.

The supply seems nearly to have been kept up, but not from the Northwest. Again we call attention to the fact that the great decrease of 20½ per cent. in the lake port receipts of grain of all kinds from the eight months of the crop year is owing chiefly to the extraordinary traffic of the year compared with. Compared with 1872-73 the decrease was but 8 per cent., and compared with 1871-72 less than 3 per cent. The winter shipments, too, which for the first quarter of this year were about 31 per cent. less than in 1874, were 23 per cent *more* than in 1873 or 1872. The shipments from the Northwest eastward for the last week reported were a trifle less than for the previous week, but much larger than for the two weeks previous. Of grain of all kinds they have been: week ending March 6, 474,588 bushels; March 13, 810,527 bushels; March 20, 1,118,840 bushels; March 27, 1,087,241 bushels. This is larger than last year's movement at the same time, and about as large as the average weekly movement of the first quarter of 1874, which was much the largest ever known while navigation was closed.

Baltimore grain and flour receipts for March were:

	1875.	1874.	Inc or Dec.	P. c.
Flour, barrels	155,238	154,287	Inc.. 951	0⅝
Wheat, bushels	286,951	215,692	Inc.. 71,259	33
Corn, bushels	945,453	1,092,487	Dec..147,025	13½
Other grain	70,826	83,732	Dec.. 12,906	15⅝

Railroad Earnings.

The following companies have reported earnings:

Year—	1874.	1873.	Inc. or Dec.	P. c.
Cleveland, Col., Cin. & Ind.	$4,248,606	$4,887,449	Dec..$638,843	13⅛
Expenses	3,182,155	3,423,398	Dec.. 241,243	7⅛
Net earnings	$1,066,451	$1,464,051	Dec..$397,600	27⅛
Earn. per mile	$9,040	$10,399	Dec.. $1,359	13⅛
Per cent. of expenses	74.90	70.04	.....	....
Three months ending September 30—	1874.			
Denver, South Park & Pac.	$5,983	.....	.....	....
Expenses	4,471	.....	.....	....
Net earnings	$1,512	.....	.....	....
Earnings per mile	$374	.....	.....	....
Per cent. of expenses	74 72	.....	.....	....
Month of February—	1875.	1874.		
Union Pacific	$620,307	$607,990	Inc.. $12,317	20⅛
Expenses	272,188	374,906	Dec.. 102,718	27⅜
Net earnings	$348,119	$233,084	Inc..$115,035	49⅜
Month of March—				
Union Pacific	823,510	651,475	Inc.. 172,035	26⅜
Great Western, two weeks ending March 19	£39 838	£44,502	Dec £4,664	10½
Grand Trunk, week ending March 13	40,100	39,700	Inc.. 400	1
St. Louis, Iron Mt. & So.— Third week in March.	$73,849	$59,671	Inc.. $14,178	23½

Chicago Traffic.

The movement in 1875 for March and the first quarter of the year is reported as follows:

	Receipts— March.	Quarter.	Shipments— March.	Quarter.
Flour, bbls	238,798	603,344	198,089	529,326
Grain, bush	3,823,563	10,459,673	2,050,033	5,596,294
Stock products, tons	10,275	46,926	32,280	121,381

The increase in grain movement in March has been but trifling, notwithstanding the generally lower rates of freight on shipments and the better weather part of the month. The month had 34.5 per cent. of the days in the quarter, and the receipts during it were 39.6 per cent. of the flour, and 36.6 per cent. of the grain received during the quarter; the shipments 37.4 of the flour and 36.6 per cent. of the grain shipped during the quarter. In "stock products" we have included cured meats, barreled pork and beef, lard, dressed hogs, tallow and hides; but not butter, cheese and wool. Notwithstanding that the quarter includes half of the packing season, and is the poorest for grain receipts, the grain and flour receipts weigh more than six times as much, and the shipments one-half more than those of "stock products."

Coal Movement.

The tonnage of anthracite coal reported by the leading lines for the three months ending March 27 were as follows:

Anthracite—	1875.	1874.	Inc. or Dec.	P. c.
Del., Lacka. & Western	541,831	507,310	Inc. 34,521	6¾
Lehigh Div., Central of N. J.	121,482	294.186	Dec. 172,704	58¾
Del. & Hud. Canal Co	590,820	495,873	Inc. 94,947	19⅛
Penna. Coal Co. over Erie Ry.	227,983	240,187	Dec. 12,204	5⅛
Philadelphia & Reading	213,053	721,990	Dec. 508,937	70½
Lehigh Valley	318,516	831,232	Dec. 512,716	61⅝
Summit Branch	60,789	55,350	Inc. 5,439	9⅞
Shamokin Div. North'n Cent.	85,387	60,305	Inc. 25,082	41⅓
Totals	2,159,861	3,206,433	Dec. 1,046,572	32⅝

The enormous decrease on certain lines was caused by the general strike of the miners in the Schuylkill and Lehigh regions.

Semi-bituminous—	1875.	1874.	Inc. or Dec.	P. c.
Clearfield coal over Tyrone Div., Pa. R. R.	190,156	142,102	Inc. 48,054	33⅞
Huntington & Broad Top	47,747	63,361	Dec. 15,614	24⅝
East Broad Top	5,878	.....	Inc. 5,878	....
Totals	243,781	205.463	Ins. 38,318	18⅝
Bituminous—				
Cumberland, all lines	257,680	231.671	Inc. 26,009	11¼
Barclay Railroad	71,862	.....	....	....
Pittsb'gh Region, over Penna. R. R. and branches	236,356	.....	....	....
Allegheny Region, over Penna. R.	38,679	.....	.....	....
Chesapeake & Ohio R. R.	26,357	.....	.....	...
Totals	630,924	.....	.....	....

Iron Movement.

Receipts and shipments of iron ore and pig iron at St. Louis for the week ending April 3 were:

	Receipts— Ore.	Pig.	Total.	Shipments— Ore.	Pig.	Total.
By rail	480	570	1,050	383	390	773
By river	...	400	400	...	...	...
Totals	480	970	1,450	383	390	773

Cotton Movement.

Mobile cotton receipts for the seven months from September 1, 1874 to April 2, 1875 were:

	1874-75.	1873-74.	Inc. or Dec.	P.c
Mobile & Ohio	137,611	165,087	Dec. 27,476	16⅝
Mobile & Montgomery	78,744	39,658	Inc. 39,086	98⅝
Mobile & Ala. Gd. Tr'k	71	398	Dec. 327	82
River boats	91,838	71,450	Inc. 20.388	29⅛
Totals	308,264	276,593	Inc. 31,671	11⅓

THE SCRAP HEAP.

Prices of Rails in March.

Bigelow & Johnston report foreign iron at $50 to $50.50 and foreign steel at $80 to $81, gold; American iron at $48 to $50, and American steel at $74 to $75, currency, per ton. There have been no imports either of iron or steel at New York this year. Last year there were no imports of iron, but 15,905 tons of steel were entered during the first quarter. Old rails are quoted at $29 to $30, scrap iron at $34 to $36 for No. 1 wrought, and for pig iron the figures are: $23 to $25 for American forge, $27 to $28 for No. 1 foundry, $25 to $26 for No. 2 foundry, and $33 to $37 for Scotch No. 1 foundry. The imports of pig iron were 1,800 tons in March, and for the quarter 4,310 tons against 10,861 tons last year, The firm say:

"*New Rails.*—There have been several quite large contracts for American rails, both steel and iron, closed during the past month, here and in the West, at fair figures, but on long time. The future appears brighter, and we trust ere long to see all our mills well employed. In foreign the stock in this market has been concentrated in the hands of one or two parties, about one-half is already disposed of for Canada, the balance held at advanced figures.

"*Old Rails.*—No sales worthy of note. Several quite large parcels are offered at our quotations without finding buyers. We think lower figures may be looked for as soon as navigation opens, and the railroads begin to take them up.

"*Scrap Iron.*—Quite a business has been done, and the stock for immediate delivery is very much reduced and held by one or two parties at our figures.

"*Pig Iron.*—In American the demand does not increase, and it would be difficult to find a buyer, either speculative or consumptive, willing to purchase in excess of his immediate requirements. In Scotch nothing being done except by the dealers purchasing the few small parcels as they are offered to arrive, and at low figures."

Railroad Manufactures.

The Rogers Locomotive Works at Paterson recently shipped some narrow-gauge engines for a Peruvian railroad.

The Danforth Locomotive Works at Paterson have turned out two narrow-gauge engines for the Des Moines & Minnesota road.

The Washburn Car Wheel Company's foundries at Hartford, Conn., and Worcester, Mass., are full of orders, and the Hartford shops are running extra time.

The Indianapolis Rolling Mills have put in a new set of rolls to make T rails of 30 pounds to the yard. The works are now rerolling a lot of iron for the Cincinnati, Hamilton & Indianapolis and the Indianapolis, Cincinnati & Lafayette roads.

A recent fire in the Southern Indiana Penitentiary at Jeffersonville destroyed a large stock of patterns and damaged nearly all the machinery belonging to the Southwestern Car Company, which occupies part of the prison buildings and uses convict labor.

The Cummings Car Works at West Bergen, N. J., recently turned out a lot of cars for the New York Elevated Railroad. The cars are of the pattern in use on that road, the central portion of the car being depressed until the floor is only a few inches from the track, the ends being raised high enough to allow the trucks to be put under.

"Would Like to Halve a Job of Being Fireman."

The manager of a new Illinois railroad has received the following letter from an aspirant for railroad honors:

"febuary the 12 1875

"i now set my self down to let you know that i Would like to halve you help me for the next two years to come and if nothing happins longer I Will tell you how i Want help i Would like to halve a job of being fireman on this new rail road i Would like to run West of elgin that is if you change cars at elgin well that makes no diferance just so that i get Work on this road I Would like to halve a job for one year of being fireman so that i can learn to be an engineer and When i learn to be an engineer I Wolde like to get Work then also & I live just three miles from stuarts ville and halve lived hear for seventeen years I am 20 years Old past my adrees is ——, po —— County Illinois my friend if you can give me Work and reazonable Wages so that i can live by it and pay my board then let me know and Whare i am to run so i can get my boarding place and so i can go and learn how to fire the thing before i commence Work I Would like to commence Work the first of march

"let me know if you can give me a years' Work and how much you can give me I can Work a year like a charn and not haive not Word of growling

"i halve alway Worked on a farm my father Wants me to Work a few years more on a farm but thare is to mutch about machinery in my head to farm

"if you can give me Work I Will do you a good job of Work as good as you can get don by eny man I rather guess my friend I Want to run on the road in the day time and sleep at nite so i can be good and fresh in the day time."

Another aspirant for railroad work certainly showed some quickness of wit and readiness to look out for a chance, even by writing to a person who advertised in the *Railroad Gazette* for a locomotive, to ask him if he did not want a fireman for the engine he wanted to buy!

Cost of the Block System.

At a recent meeting of the London & Northwestern, the greatest of English railroads (4,960 miles of road with 1,935 locomotives), the President said, explaining the constant increase of expenses:

"There is one other point, and that is the enormous expense of the block system. How it will turn out one cannot tell. Of course if our servants make mistakes the block system will act no better than any other system. There are various things to be done, and it is not settled what will be done. In fact there is nothing settled in the railway world. You have only been at work fifty years, and every year there will be improvements which will cost more money and make the working more secure, but you must never expect that you will stand still. The block system costs you from £200,000 to £300,000 a year, besides the cost of laying down the signals and concentrating points and so on. This is a heavy burden, and what the result is we don't know; but it has made it very difficult in the first place to manage the line."

RAILROAD LAW.

Liability of a Corporation for Acts of Its Employes.

In the case of Mary Baulec against the New York & Harlem Company, in which the plaintiff sought to recover damages for the death of her husband, an employe of the company, which, it was claimed, resulted from the carelessness of another employe, a switchman, the lower court decided against the plaintiff. The case was carried to the Court of Appeals, which has affirmed the decision of the lower court, the points of the decision being summarized as follows by the New York *Register:*

"If a master is wanting in proper care in the selection of servants, and negligently or knowingly employs or retains in his service those who are incompetent and unfit for the duties to which they are assigned, he is liable to respond to other employes and servants engaged in the same service who may sustain damages by reason of such incompetence and unfitness.

"When the master is a corporation, necessarily acting by and through agents, the acts of its general agents—charged with the employment and discharge of servants in the performance of that duty—must be regarded as its acts.

"But when reasonable precautions and efforts to procure safe and skillful servants are used, and without fault one is employed through whose incompetency damage occurs to a fellow servant, the master is not liable.

"When the general fitness and capacity of a servant are involved, the prior acts and conduct of such servant on specific occasions may be given in evidence, with proof that the principal had knowledge of such acts."

Responsibility of Sleeping Car Companies for Property of Passengers.

In the case of Palmetier against the President of the New York Central Sleeping Car Company in the New York Marine Court, the plaintiff recovered a verdict for the loss of a part of his personal baggage which was stolen while he was asleep in one of the defendant's cars. Application was made for a new trial, but denied, the Court holding that while the owners of a sleeping car could not be held as innkeepers, or as insurers, from the very nature of the accommodations offered

they were bound to use reasonable care and to supply a sufficient watch to protect passengers in their persons and property while asleep. Therein their liability is greater than the ordinary one of railroad companies, in whose common cars a passenger bears his own risk of loss, if he sleeps.

Ladies' Car.

In the case of Bass against the Chicago & Northwestern Company on appeal, the Wisconsin Supreme Court in ordering a new trial on account of errors in the court below, gives its opinion that a railroad company has a right to set aside a car in a train for ladies and that such a regulation is entirely just and proper. No passenger not included in the terms of such regulation is entitled to enter the ladies' car except by permission of the company's officers in charge of the train for the time being. While the company is bound to furnish seats for all its passengers, nevertheless a passenger who cannot find a seat in any other car is not justified in forcing his entrance into the ladies' car and taking a seat there. He may enter the car if no opposition is made, but he does so only by permission, not by right.

Liability for Railroad Passengers on Cars.

Some time since, as Mr. Jason Weeks was riding in a car of the New York, New Haven & Hartford road, which was being drawn by horses through the city of New York to the depot in Twenty-seventh street, there being but few others in the car, a gang of men entered the car, pushed him roughly against the stove and robbed him of a satchel containing bonds valued at $16,000. Mr. Weeks then brought suit against the company to recover the value of his bonds, claiming that the loss thereof occured in consequence of the negligence of the company not affording sufficient protection to its passengers. The case was tried in the New York Supreme Court, February 19, before Judge Van Brunt and a jury. The facts were not disputed, and the case turned on the legal responsibility of the defendant.

Judge Van Brunt, while characterizing the question involved as both new and important, submitted for the decision of the jury whether or not the company or its officers had been guilty of negligence in not better protecting from violence the passengers traveling over the road.

The jury found in favor of plaintiff for the full value of the bond —$16,000—with interest thereon from the date of the robbery, making, in all, $16,782.47.

Taxation of Michigan Land Grants.

In the case of Tucker, Prescott and others against Freeman and others, on appeal from the Circuit Court for the Western District of Michigan, the United States Supreme Court delivered an opinion March 1, holding that lands granted to the State of Michigan for railroad pvrposes are liable to taxation when the road is completed, although the bonds secured by mortgage for money to build the road are unpaid, and these lands are the principal resource for their payment. The decision of the lower court was affirmed.

The Right to Require Passengers to Buy Tickets Before Entering a Car.

In the case of Alin against the Toledo, Wabash & Western Company, the Ohio Court of Common Pleas has decided that a railroad company has the right to make and enforce regulations compelling passengers to buy tickets before entering cars. The case was one on which suit was brought by the plaintiff to recover damages for ejectment from a train, he having failed to buy a ticket and having refused to pay the extra sum demanded in such cases by the company.

Limitation of Liability for Negligence.

The Supreme Court of Pennsylvania decided Jan. 4, 1875, in the case of Kirby against the Pennsylvania Railroad Company, that the Pennsylvania act of April 4, 1868, enacting that persons engaged about the premises of railroad companies, although not employed by the company itself, should only have the same right to recover against the railroad for an injury as one of its employes would have, is constitutional. In this case a man engaged in aiding in loading coal in behalf of others than the railroad company was injured by negligence of the railroad company's servants in leaving a switch open.

Right to Include in a Mortgage Property to be Afterward Acquired.

Some time since certain cars belonging to the Petersburg Railroad Company were attached while on the Baltimore & Potomac road at the suit of the First National Bank, of Staunton, Va. Messrs. McIlwain and Brown, trustees under a mortgage given by the company, claimed the property attached, and sought to have the attachment removed. This was resisted for the reason that the cars were acquired after the date of the mortgage, which by its terms included all property then owned or afterward to be acquired. The Maryland Superior Court decided that the company had a right to put such a clause in the trust deed, and that the claim of the trustees was good.

Validity of Contract to Pay Money in Consideration of the Location of a Railroad by a Particular Route.

At the August term of the Oregon Supreme Court, in the case of Ben Holladay and A. W. Patterson, a decision was made of which the following are head notes:

1. H., being a director and president of the Oregon & California Railroad Company, and the owner of a majority of the stock of said company, agreed with P. that in consideration of a certain sum of money, he would cause the line of said road to be located on a certain route, and a depot to be located at a certain place, instead of adopting another route then surveyed, which was shorter, and over which said road could be constructed at less expense: *Held*, that such a contract is contrary to public policy.

2. A corporation organized for the construction of a railroad, is a *quasi public* corporation, and the public have an interest in the location of its line of road and depots.

3. An agreement which tends to lead persons, charged with the performance of trusts or duties for the benefit of others, to violate or betray them, will not be enforced.

OLD AND NEW ROADS.

Auction Sales of Railroad Securities.

In New York, April 7, the following prices were obtained at auction: Louisville & Nashville, first mortgage, 87¼ and 87½; New Orleans, Jackson & Great Northern, first mortgage, 96¾; second mortgage, 88¼; Mobile & Ohio, first mortgage currency bonds, 68 to 71½; funded interest bonds, 66 and 67; Atlantic & Gulf, consolidated mortgage, 71 to 73; Boston, Hartford & Erie, first mortgage, guaranteed by the Erie, 35 and 36.

Indianapolis, Bloomington & Western.

The Receiver has made an agreement by which all the traffic of the road for Cincinnati, which has heretofore gone over the Indianapolis, Cincinnati & Lafayette road eastward from Indianapolis, will hereafter be sent by the Cincinnati, Hamilton & Indianapolis and the Cincinnati, Hamilton & Dayton. A through passenger line is to be organized to run by this route from Cincinnati to Burlington, Ia., and Omaha.

The Floods in the Susquehanna Valley.

Contrary to general expectation, the great ice-gorges on the Susquehanna River broke up and passed out without doing any very serious damage to bridges or other railroad property. This result was mainly due to several days of warm weather which weakened the ice so that when the river rose it broke and was carried out easily. The same cause produced the same result in the Delaware, where serious trouble had been expected at the Water Gap and below.

St. Paul & Pacific.

A meeting of holders of bonds issued under the First Division mortgage dated April 1, 1871, is to be held at the office of J. S. Kennedy & Co., No. 41 Cedar street, New York, April 16, at 1 p. m., to act on the question of removing one or more of the trustees, the appointment of a new trustee or trustees, and such other business as may be brought before the meeting.

New Russian Railroads in 1874.

During the past year the following railroads and parts of railroads were opened in Russia:

	Miles.
January 12—Landovarovo-Romny Railroad, from Homel to Bachmatsch	122
March 5—Tambov-Saratov, branch from Sosnovka to Bekov	9
June 23—Losovaja-Sebastopol, Section II., from Alexandrovsk to Melitopol	70
June 23—Notovotorschok Railroad, from Torschok to Rschewo	64
July 15 Landvarovo-Romny, from Bachmatsch to Romny	48
October 12—Morschausk-Syaran Railroad, from Morschausk to Syaran	323
October 14—Losovaja-Sebastopol, Section III., from Melitopol to Simferopol	152
December 15—Rjaschsk-Wiasma Railroad, from Pavelez to Wiasma and from Chruschtschovo to Jelez	380
Total	1,168

At the beginning of the current year the total railroad system of Russia and Finland measured 17,539.7 versts, which is just about 11,600 miles, which is very little more than the mileage of France. This is at the rate of one mile of railroad to 192 miles of surface of European Russia. There are now seven railroads in the Empire in course of construction.

Columbus, Chicago & Indiana Central.

The semi-annual interest due on the $15,000,000 first mortgage bonds, April 1, was not paid on account of the refusal of the lessee, the Pittsburgh, Cincinnati & St. Louis Company, and its guarantor, the Pennsylvania Railroad Company, to pay over to the receivers the rental due in accordance with the terms of the lease. The lessees allege in defence of the refusal that some of the covenants of the lease have not been complied with by the Columbus, Chicago & Indiana Central Company and that suit has already been begun to enforce the performance of the agreement.

A meeting of the bondholders was held in New York, April 6, when a statement was made by Mr. C. F. Southmayd on behalf of the committee as to the legal aspects of the bondholders' position. The bondholders were urged to sign the agreement empowering the committee to take action to protect their interests. The agreement has been signed by bondholders representing nearly $3,000,000, but no action can be taken until $5,000,000 has been signed.

New Jersey Midland.

A change has been made in the receivership, the Chancellor having appointed Garrett A. Hobart and James W. McCulloch Receivers on application of the first-mortgage bondholders. Mr. Hobart was already Receiver, having been appointed in a suit for the recovery of overdue coupons.

A span of the bridge over the Passaic at Dundee was carried out by ice and high water a few days since, and much trouble has been caused by land-slides on the upper end of the road. The Receiver has paid the employes a portion of their wages for March.

New York Central & Hudson River.

On appeal from the Circuit Court, the Supreme Court of the United States has decided against the company in the suit to recover taxes paid upon the certificates issued by the Central before its consolidation with the Hudson River. The Court holds that these certificates, payable at the pleasure of the company, are properly taxable under the act of 1866, which provides that the dividends declared by a railroad company in scrip or money due and payable to their stockholders as part of the earnings, profits, income or gains of such company, and all profits of such company carried to the account of any fund or used for construction, are proper objects of taxation. By the terms of the act, a dividend in scrip declared by such company as a part of its earnings is subject to the tax whenever or wherever or to whatsoever party or person the same shall be payable. What is required to be due is the scrip, and not the funds, money, or proceeds which it represents. Beyond doubt such scrip becomes operative and due within the meaning of the revenue act when it is unconditionally declared, without containing any provision postponing its effect.

The spring freshet and the breaking up of the ice on the Hudson River has made serious breaks in the tracks of the Hudson River Division near Castleton, N. Y., and all through trains have been sent from New York to Albany by the Harlem road for several days.

Savannah & Charleston.

The Court of Common Pleas has refused to grant the petition of the Comptroller-General of South Carolina to be allowed to seize the road for debt due the State. This action continues the road in the hands of the present Receiver, Mr. Mitchell.

Chicago, Danville & Vincennes.

The United States Circuit Court has decided that the Osgood foreclosure suit, in which Messrs. Brown and Hammond were appointed receivers, has been properly removed from the Illinois Circuit Court. The United States Court will retain jurisdiction of the case.

The next proceeding in the case will be the motion for the appointment of a receiver in the foreclosure suit brought by the trustees under the first mortgage. This suit, it is charged, has been brought by the trustees in order to supersede the first suit and to secure a receiver more friendly to the old management.

Detroit & Milwaukee.

The trustees under one of the mortgages have filed an application for a receiver. The suit is for the foreclosure of the Street-Douglas mortgage of 1866, which amounts to $1,702,000, and is begun at the instance of the Bank of Montreal, which is a large holder.

Meetings.

The annual meeting of the Lake Shore & Michigan Southern Railway Company will be held in Cleveland, O., May 5.

Logansport, Crawfordsville & Southwestern.

The Receiver has obtained two new engines and some fine passenger coaches to accommodate the increasing passenger business of the road.

Whitewater Valley.

The lessee, the Indianapolis, Cincinnati & Lafayette Company, is preparing to put the road in good order and several hundred tons of new iron is to be put down. Additional trains are to be put on and the local business cultivated.

Brunswick & Albany.

It is stated that the bondholders have offered to lease the road to the Atlantic & Gulf Company, and that President Screven of that company has been in conference with the representatives of the Brunswick & Albany on the matter. The lease of the road would give the Atlantic & Gulf a more direct road from Savannah to Albany, but it is not likely that that company—or indeed any other—would be willing to pay any considerable rental. It is rumored that if the lease is made, the iron will be taken up from Brunswick to Waycross, the Atlantic & Gulf crossing, and used in laying the track westward from Albany to Eufaula, which section is all or nearly all graded. This is probably the best use that could be made of it.

Baltimore & Ohio.

This company has again begun running its trains to Alexandria by way of the East Alexandria Branch and the ferry across the Potomac, as formerly, having ceased to use the Baltimore & Potomac and Washington & Alexandria track.

The suit of the State of Maryland against the company has been argued in the United States Supreme Court, and a decision will be given shortly. The case comes before this court from the Court of Appeals of Maryland, and involves the right of the State to collect the 20 per cent. tax imposed by the General Assembly upon the passenger receipts of the Washington Branch. The company claims that the tax is unconstitutional. The tax was paid by the company from 1835 to 1868, when payment was refused, and it has since been in litigation.

Pennsylvania.

At the annual meeting last month, a resolution was adopted requesting the directors to declare henceforth a quarterly instead of a semi-annual dividend, in case such arrangement would not conflict with the company's charter. President Scott stated at the time that the directors were perfectly willing to make the desired change, if they did not have to go to the Legislature to effect it, and the directors therefore submitted the subject matter of the stockholders' resolution to Attorney-General Dimmick, with a request that he would decide whether or not dividends could be legally declared quarterly instead of semi-annually. It is stated that Mr. Dimmick, having thoroughly investigated the question submitted, has given a written opinion to the directors, informing them them that there is no legal restriction whatever against the change, which will therefore probably be made.

The Hoosac Tunnel Line.

The Governor of Massachusetts has finally approved the bill passed by the Legislature providing for the management of the tunnel and State road on the "toll-gate" plan, the State to retain possession and allow their use by any company desiring to make connections with them at fixed rates of toll.

It is understood that arrangements are completed for a through line from Boston to the West to run over the Fitchburg road and through the tunnel.

Northern Central.

At a special meeting in Baltimore, March 31, the stockholders voted to authorize the issue of $1,000,000 new bonds under the consolidated mortgage of May, 1874, to pay for contemplated improvements, which include new car-shops, a building for the general offices in Baltimore, an elevator, wharves and warehouses at Canton.

The Railroad War.

The New York Central and the Erie have joined in the contest heretofore confined to the Pennsylvania and the Baltimore & Ohio, both companies having reduced their passenger rates largely. The new rates are as follow: From New York to Cincinnati, $15; Louisville $18; Indianapolis, $16; St. Louis, $20; Quincy, $22; Kansas City, $31; Chicago, $18; Omaha, $34. Proportionate reductions will be made by the Erie from Philadelphia and Boston.

No definite arrangements have been made as to freight rates, but those of the tariffs last noted are, at least nominally, maintained. It is charged that many devices are resorted to by agents to cut rates while apparently maintaining them.

There are still many rumors to the effect that the Baltimore & Ohio is trying to secure control of the New Jersey Southern and use it as a line to New York. So far there is no apparent foundation for such reports, and it is possible that they are only put out to raise the price of the stock, which is really of no value. The road is in possession of the trustees of the first mortgage, which can be foreclosed at any time.

Valley, of Virginia.

The special meeting of the stockholders, which was to have been held in Staunton, Va., April 7, has been postponed until April 20.

Panama.

The new board of directors has resolved to give the required three months' notice of termination of the present contract with the Pacific Mail Steamship Company.

Oswego & State Line.

This lately organized company has been consolidated with the Pierce City & Kansas Company of Missouri under the name of the Missouri & Western Railroad Company. The capital stock will be $1,030,000.

Montana.

Meetings are being held to advocate the building of and to secure territorial and local aid for a narrow-gauge railroad to extend the Utah Northern to Helena, Montana.

St. Louis, Iowa & Minnesota.

Articles of incorporation of a company by this name have been filed with the Secretary of State of Iowa. The capital stock is to be $9,000,000. It is said that the object of the company is to take the Iowa Central from the existing company to complete it southward to Moulton and northward to a connection with a line to St. Paul.

The International and the Texas Aid Bonds.

The final compromise with the State of Texas, whereby the State gives a land subsidy and exemption from taxation in place of the promised subsidy in bonds, has been accepted. A special meeting of the stockholders was held in Houston, Tex., March 29, at which 42,000 shares out of 55,000 were represented, and the vote was unanimous in favor of accepting the compromise.

It is stated that surveys are to be begun at once for the extension from Rockdale southwestward to Austin.

Little Rock & Fort Smith.

The rails are down for eight miles westward from Clarksville, Ark., and tracklaying is progressing steadily.

Missouri River, Fort Scott & Gulf.

The general offices have been removed from Kansas City, Mo., to Rosedale, Kan., the change being made to comply with the new law which requires Kansas companies to keep their offices within the State.

Long Island.

Considerable reductions have been made in the local freight rates. Mr. Custis, the new Superintendent, is visiting the towns along the line with a view to ascertain their requirements in the way of passenger and freight accommodations, the intention being to build up the business of the road. The market gardeners on the line are endeavoring to arrange for a special market train which will deliver produce to New York as early as 2 A. M. each day.

Reading & Lehigh.

The terms of the lease to the Philadelphia & Reading Company have been published. The lease is for 99 years from March 1, 1875, and includes the whole road from High's Farm, east of Reading, to Slatington. The lessee buys the equip-

ment for the sum of $40,791.91, and assumes all debts owing on account of such equipment, and agrees to pay out of that sum all land damages that may be due by the lessor. The lessee is to pay all taxes and other charges on the property and to pay over to the lessor all net earnings semi-annually, March 1 and September 1. There does not appear to be any guarantee of interest on the funded debt, and nothing is said about the lease which the Wilmington & Reading Company holds of the road from High's Farm into the city of Reading.

New York Elevated.

Some weeks since some property owners on the line applied for an injunction to prevent the erection of a turnout. The application claimed that the company had forfeited its charter by using locomotive engines and also by charging higher rates of fare than those allowed by law. The New York Supreme Court has refused to grant the injunction, holding that forfeiture of charter can only be established by a suit brought by the State and such a question cannot be brought up on a motion like the present one.

Rockford, Rock Island & St. Louis.

The United States Circuit Court, no objections having been presented, has made an order authorizing the Receiver to compromise the claims of the company against H. H. Boody, as noted last week.

Southern Minnesota.

The high water in Root River about the last of March caused serious damage to this road. The road-bed was washed out in six places between Houston and Mound Prairie, and another bad break was reported near Hokah, March 30. Trains were entirely suspended for several days. The extreme high water rose over the track in several places where it has been raised to avoid similar trouble.

Chesapeake & Ohio.

The Legislature of Virginia has passed the bill authorizing the city of Richmond to subscribe $100,000 to aid this company in completing its western connections.

Southwestern & Rio Grande.

This company desires to let 23 miles of its road to contractors who have the funds to build and equip that section ready for business. Seven miles of the road are graded. It is to be of three-feet gauge. The company's office is at Shreveport, La., from which city it has a grant of aid.

The Missouri Railroad Law.

Further provisions of the law, which the Governor has approved, in addition to those relating to classification and rates (given last week), are as follows:

Any company violating the act shall forfeit all right to compensation for the service rendered wherein such violation is attempted. Individual agents refusing freight at legal rates or otherwise violating the act shall be liable to $200 fine. All charges in excess of legal rates shall be deemed misdemeanors rendering the party liable to a fine of not less than $20 nor more than $200 for each offence, and the person overcharged may recover three times the amount charged.

The Commissioners are to have power to administer oaths, summon witnesses and require production of books and papers.

The Commissioners are to examine the roads as often as they deem necessary. If they judge any part of a road unsafe they may order repairs and require reduced speed of trains. A refusal to make repairs ordered shall be punished by fine and imprisonment, and in case of accident to life or limb, in such cases, the Superintendent, conductor and engineer shall be deemed guilty of felony. The Commissioners can also order the running of passenger trains to be stopped.

The companies are required to make annual reports on August 1 of each year, which shall include the amount of stock subscribed and paid in, and the name, residence and holding of each stockholder; funded and floating debt and assets; estimated value of property; length of all tracks laid; tonnage of through and local freight; monthly passenger and freight earnings; train expenses; total expenses of working the road and salaries of all officers in detail; repairs and maintenance; cost of improvements; locomotive expenses; passenger rates; freight tariffs; instructions to agents; names of express and transportation companies, terms granted to them and kind of business done by them; running arrangements with other roads, and answers to any other questions the Commissioners may require.

The three Commissioners appointed by the Governor hold office only until January 1, 1877. At the general election of 1876, three Commissioners shall be chosen by the people to hold office two, four and six years respectively, and thereafter one shall be chosen every two years to hold office for six years. In case of a vacancy occurring, the Governor shall make an appointment to hold only until the next general election. The Commissioners are to receive $2,500 a year each, to appoint a Secretary and to have their office in St. Louis. No person having an interest in or employed by any railroad or transportation company is eligible to the office of Commissioner.

Keokuk & Des Moines.

The proposals for the grading and masonry of the proposed new line between Buena Vista and Sand Prairie were opened by the Engineer March 26. There were 16 bids for the earthwork and 11 for the masonry and rip-rap. The contracts have not yet been awarded.

Virginia Railroad Law.

The Virginia Legislature has passed a bill which amends the existing law requiring annual reports to be made to the Board of Public Works so as to require the companies to report, under the head of transportation, the "number of passengers of each class carried in cars; the number of tons of pig iron, coal, coke, lead, salt and other minerals; the number of pounds of leaf tobacco, tobacco stems, manufactured tobacco, cotton, wheat, corn, oats, rye, flaxseed, bacon, butter, eggs, dried fruit, hay, shucks, sumac, wool and tallow; carloads of cattle, calves, hogs, lambs and sheep; carloads of wood and bark and lumber, and barrels of flour, whiskey, cement, lime and tar transported as aforesaid, inward and outward. This enumeration of articles may be enlarged or diminished prior to the beginning of any fiscal year by the Board of Public Works."

Marquette & Mackinaw.

The new bill making a grant of swamp lands in aid of the road from Marquette on the Upper Peninsula to Mackinaw, has passed both houses of the Michigan Legislature.

Cincinnati, Sandusky & Cleveland.

The suit against the sureties of Rush R. Sloane, the former President, who absconded while under bail to meet charges of embezzlement, has been compromised. The bondsmen agree to pay the company $32,500 in five equal semi-annual instalments, beginning April 1. The whole amount of bail was $46,000.

Wilmington & Reading.

The Court having decided in favor of the legality of the execution obtained upon unpaid coupons from the second-mortgage bonds, the Sheriff of Berks County gives notice that he will sell at public auction in Reading, Pa., April 22, that part of the road which lies in Pennsylvania, which is 59 miles long, from near Reading to the Delaware line. The sale will include the road and franchise with all the buildings, sidings and permanent improvements and the lease of that part of the Reading & Lehigh road from High's Farm, near Reading, into the city. All employes of the road are ordered to file their claims with the Sheriff at least five days before the sale.

Utica, Ithaca & Elmira.

This company has begun to run trains over the Western Extension of the New York & Oswego Midland, between De Ruyter and Norwich.

Geneva & Southwestern.

It is stated that work is to be begun on this road, which is to extend from Geneva, N. Y., southwest to Wayland on the Rochester Division of the Erie, a distance of about 33 miles.

Terre Haute & Indianapolis.

This company has leased and fitted up new and very handsome offices for the General Passenger and General Freight Agents in St. Louis. They are situated at the corner of Fourth and Chestnut streets, and are very finely furnished.

Minneapolis, St. Paul & Iowa.

This newly organized Minnesota Company has been formed in the interest of the Burlington, Cedar Rapids & Minnesota Company. Its line is intended to run from that road near Plymouth, Ia., northward to Albert Lea, Minn., and thence through Waseca, Waterville, and Jordan, to a point near Carver, on the Minneapolis & St. Louis road. A branch line is to be built to St. Paul.

Utah Western.

The people of Tooele, Utah, have offered to give the right of way and two acres of land for depot purposes and to exempt the road from taxation for five years, provided the road is run through their town and is located under the supervision of the city authorities wherever it crosses or uses a public highway.

Louisville, New Albany & St. Louis.

Parties connected with the Lake Erie, Evansville & Southwestern road are endeavoring to secure the completion of the Louisville, New Albany and St. Louis to Huntingburg, Ind., where it will intersect their road.

Baltimore & Drum Point.

Arrangements are being made to put a section of 15 miles of this road under contract.

Lancaster & Reading.

The last rail was laid on the Quarryville Branch, March 24, and the line will soon be opened for traffic. It is about 15 miles long, from Lancaster, Pa., southeast to Quarryville, and will be operated by the Philadelphia & Reading Company.

The Lancaster & Reading road was originally intended to connect the two cities of that name and to be of 3 feet gauge, but the project was practically abandoned and the Quarryville Branch built of standard gauge under an agreement with the Reading Company. It is not likely that the main line will ever be built.

Mississippi Valley & Western.

The bridge over the Des Moines River near Keokuk, Ia., was carried away by the ice and high water March 27. Arrangements have been made to rebuild it as soon as possible.

The Wisconsin Railroad Law.

The Milwaukee *Sentinel* says:

"The discovery that in the classification act of last winter the Chicago, Milwaukee & St. Paul Railroad is described as 'the St. Paul Railroad' is an awkward development in connection with the legislation of the late session. The intention is clear enough; but if the courts should give that company the benefit of the defect in the phraseology of the act, it would be permitted to charge rates higher than any that it has fixed for some years.

Pittsburgh, Washington & Baltimore.

The Second Branch of the Baltimore City Council has passed the ordinance providing for the sale of the city's interest in this road to the Baltimore & Ohio Company for $1,000,000.

Western Maryland.

This company has concluded an arrangement with the Baltimore & Potomac and the Union Railroad companies for the passage of its cars through the tunnel and by the Union road to the Canton wharves.

Port Dover & Lake Huron.

This company has offered to the stockholders an issue of $244,000 bonds, the proceeds of which will complete the road. The amount already raised is $416,000, most of which has been expended. The road is 63 miles long, from Port Dover, Ont., to Stratford.

Merrillan & Neillsville.

There is talk of building a railroad from Merrillan, Wis., northeast through Neillsville to a connection with the Wisconsin Central, a distance of about 35 miles.

Illinois Railroad Law.

The suits against the Chicago & Alton Company in the Madison Circuit Court for infringement of the law, have been postponed until the next term and will probably not be tried until October.

Poughkeepsie Bridge.

With the consent of all the other stockholders, this company has formally released A. L. Dennis and the Estate of J. Edgar Thomson from the large subscriptions which Mr. Thomson and Mr. Dennis were understood to have made on behalf of the Pennsylvania Railroad Company.

New York, New Haven & Hartford.

The new depot in New Haven will probably be ready for use in May, and some of the offices have already been moved in. A new depot is to be built at Lyme, on the Shore Line Division, this season, and another at New London, provided the land can be secured. The substitution of steel for iron rails on the Shore Line Division will be completed this season.

Connecticut & Passumpsic Rivers.

The employes in the shops all began to work full time April 1.

The lease of the Southeasterd Railway is a partnership affair, though nominally entirely in the name of this company, for legal reasons. The Passumpsic Company has one-half share and the Boston, Concord & Montreal and Colonel Foster each one-quarter.

Tennessee & Pacific.

A movement is on foot to secure a change of management at the coming election. It is thought that a new administration may possibly improve the earnings of the road, which are now very little more than the working expenses.

New Jersey West Line.

The New Jersey Court of Errors and Appeals has set aside the order of the Chancellor which directed the Receiver to sell the road free from all encumbrances. The effect of this decision will probably be to return the control of the property to the trustees under the first mortgage, and the result will be a sale under foreclosure. In that event the road is likely to pass into the hands of the Delaware, Lackawanna & Western Company and be operated as a branch of the Morris & Essex Division, unless the holders of the bonds are willing to lay aside their differences and unite in buying in the road and completing it.

The road is in operation from Summit, N. J., west to Bernardsville, 15 miles. Some work has been done west of that point, and the grading and bridging is nearly all done from Summit east to Waverley, near Newark.

Nashville, Chattanooga & St. Louis.

The board of directors has voted to accept the provision of the Tennessee tax law under which companies paying into the State Treasury annually 1¼ per cent. of their gross earnings are to be relieved from all other taxation for ten years. The necessary legal acceptance will be prepared and filed as soon as possible.

North Pacific Coast.

The long pending lease of the San Rafael & San Quentin road has at last been finally ratified, and the lessee has taken possession. The leased line is about four miles long and gives the company a second line to San Francisco Bay and a second water terminus, at San Quentin. The gauge of the leased road will be changed to 3 feet at once.

Chicago, Saginaw & Canada.

It is stated that this company has completed negotiations in New York for 40 miles of iron for the road.

Alabama & Chattanooga.

By agreement with the trustees for the bondholders the sale of the road, which was to take place April 5, has been postponed to May 3.

Macon & Brunswick.

Governor Smith, of Georgia, has ordered the sale of this road to satisfy the State lien, to take place at Macon, Ga., June 1. The sale includes the main line from Macon to Brunswick, 186 miles, with the branch from Cochran to Hawkinsville, 11 miles.

Evansville, Owensboro & Nashville.

At a meeting of the stockholders in Owensboro, Ky., recently, President McDonald stated that there was no hope for a completion of the road by the present company. He and the entire board of directors proposed resigning at once. A financial statement was presented. A resolution was adopted instructing the officers of the company to procure the necessary judgment of the court for the sale of the road.

ANNUAL REPORTS.

Boston, Clinton & Fitchburg.

This company owns a line from South Framingham, Mass., to Fitchburg, 42¾ miles, with a branch from Pratt's to Sterling Junction, 5 miles, and the Marlboro Branch, 1¼ miles, making 49¼ miles owned. It leases the Framingham & Lowell road, 26 miles, and the Mansfield & Framingham road, 21¼ miles, making 47¼ miles leased and 96¾ worked. It also leases the New Bedford road, the operations of which are not included in the report. Its system connects the manufacturing cities of Lowell and Fitchburg in the north with tidewater at New Bedford, and it controls a steamboat line from that city to New York. Its lines are also well placed for the distribution of coal from the depot at New Bedford to the interior. Its trains are run from South Framingham to Boston over the Boston & Albany.

The earnings of the road for the year ending September 30 were:

	1874.	1873.
Passengers	$243,629 93	.....
Freight	395,149 38	.....
Express, mails and rents	26,861 12	.....
Total earnings	$665,640 43	$677,439 37
Working expenses were	445,873 19	479,944 55
Net earnings	$219,767 24	$197,494 82
Dividend on guaranteed stock, interest and rents	193,904 71	
Surplus	$25,862 53	

The decrease in earnings was $11,798.94, or 1.7 per cent.; the decrease in expenses, $34,071.36, or 7.1 per cent.; the increase in net earnings, $22,272.42, or 11.3 per cent. Operating expenses were 66.98 per cent. of earnings in 1874, and 70.85 per cent. in 1873.

The earnings of the Mansfield & Framingham Division increased $6,603.24, and those of the Framingham & Lowell decreased $17,076.43 from the previous year. The latter loss is caused mainly by the fact that the northern business of the company is now sent by way of North Acton and the Nashua, Acton & Boston road instead of by Lowell, and therefore passes over only a part of the Framingham & Lowell instead of the whole. A large increase of business on this division is expected from the new connection with the Boston & Maine at Lowell, giving a direct outlet for eastern business. The New Bedford lease returned a direct profit of $23,083.17.

The earnings of the several divisions were as follows:

	Earnings.	Earnings per mile.
Boston, Clinton & Fitchburg proper	$377,850 09	$7,672
Mansfield & Framingham	194,783 88	9,166
Framingham & Lowell	93,006 46	3,577
Totals	$665,640 43	$6,898

The following expenditures made during the year were charged to capital account: Station building at camp ground, South Framingham, $3,300; passenger cars, $8,717.27; new coal cars, $103,785.53; bond discount, $27,020.95. Total, $142,823.75.

The business in connection with the steamboat line from New Bedford to New York has been very good. The consolidation of the Taunton Branch with the New Bedford Company has been completed and the results of the lease of the whole property to this company have been very satisfactory.

For the first time the results of the operations have justified a dividend on the common stock, and one of $3 per share was declared and paid January 1, 1874.

Eastern.

This company owns a line from Boston northeast to the New Hampshire line, 41.39 miles, which is continued to Portsmouth, 16.55 miles by the Eastern of New Hampshire and from Portsmouth to Portland, Me., 52 miles, by the Portland, Saco & Portsmouth (both leased), making a main line 109.94 miles long from Boston to Portland. It owns the Lawrence Branch, 19.66 miles; the Gloucester Branch, 17.35 miles, and a number of short branches in Massachusetts. It leases the Portsmouth, Great Falls & Conway, from Portsmouth, N. H., to Conway, 71.37 miles, with a branch to Wolfeborough, 12 miles, and the Portsmouth & Dover road, 12 miles. The Eastern of New Hampshire and the Portsmouth, Great Falls & Conway are practically consolidated with the Eastern, though separate organizations are maintained under the New Hampshire charters. The total length of road worked is 264 miles, of which 40 miles is double track.

The property owned is represented by the following securities:

Capital stock	$4,997,600
Bonds	5,773,300
Notes payable, including coupon notes	5,666,900
Total	$16,467,800

The ordinary current bills payable amount to $515,080.43.

The notes payable are nearly all coupon notes, having 10 years to run. New bonds to the amount of $2,452,900 were issued during the year, and $1,130,000, which fell due August 1, 1874, were retired. The annual interest charge is $750,641, of which $175,194 is payable in gold.

The cost of the property is reported as follows:

Railroad	$11,906,000 02
Equipment	2,343,064 27
Property (land, securities of leased roads, etc.)	2,541,008 33
Total	$16,790,072 62

The report says: "The contract for a division of the business at competing points with the Boston & Maine Railroad, which was announced at the last annual meeting, was, after some delay, executed in April, and went into effect May 1. It has worked satisfactorily to both parties, and tended to check the profitless competition which had before existed. It is to be hoped that further stipulations may be made with the Boston & Maine Railroad, so as to include all business for which the Eastern and Boston & Maine compete, and to this the efforts of your directors have been steadily directed, with a fair prospect of success. * * * * *

"The contract between this corporation and the Maine Central Railroad Company, presented to the stockholders at their last annual meeting, and ratified by them, having proved unsatisfactory to that corporation, was annulled in December last, and on January 1, 1875, a new agreement was entered into, abrogating all previously existing contracts with that road, and placing the two corporations, as it is believed, in fair business relations with each other, under which an amicable and mutually profitable connection is confidently expected for the future."

A considerable increase in freight traffic is looked for on the opening of the Portland & Ogdensburg line, which is expected during the present year.

The earnings and expenses for the year ending September 30 were as follows:

	1874.	1873.
Earnings from passengers	$1,757,348 67	$1,773,909 52
Freight	1,063,781 38	1,027,785 23
Express, mails and miscellaneous	238,863 86	142,039 04
Total earnings	$3,059,933 91	$2,943,733 79
Expenses for fuel	$371,564 30	$408,076 75
Maintenance of way	369,549 85	566,632 80
Locomotive power	285,786 80	355,477 08
Train expenses	402,300 94	466,080 81
Station expenses	366,572 21	370,386 67
General expenses	91.844 99	104,796 60
Insurance and taxes	95,392 58	79,006 43
Total expenses	$1,981,011 67	$2,350,457 14
Net earnings	$1,078,922 24	$593,276 65
Gross earning per mile	$10,928	$11,108
Net earnings per mile	3,853	2,239
Per cent. of expenses	64.74	79.84

The increase in gross earnings over the previous year was $116,200.12, or 3.9 per cent.; the decrease in expenses, $369,445.47, or 15.7 per cent.; the increase in net earnings, $485,645.59, or 81.9 per cent.

A summary of the income account is as follows:

Net earnings		$1,078,922 24
Profit and loss account		414,490 41
Total		$1,493,412 65
Balance of Revere disaster	$326,599 42	
Losses by fire, 1873 and 1874	77,647 99	
Injuries and damages	47,070 38	
Rebuilding engine	9,647 30	
Steel and iron rails	46,718 03	
Depreciation of working stock	51,354 44	
Balance of interest account	682,047 68	
		1,241,085 24
Surplus		$252,327 41

The strictest economy has been practiced, but the road has not been allowed to suffer. There have been used in repairs 1,357 tons new iron rails, 24 miles steel rails and 81,431 new ties. Twelve miles of rails have been repaired and relaid and a large amount of ballasting done. Seven miles of new sidings have been built and 4,927 lineal feet of bridging, including a new draw over Mystic River, and an iron bridge 606 feet long over the Saco River at Biddeford. The connecting track from the Conway road to the Portland & Ogdensburg in Conway has been completed. Fifteen miles of new fence have been built.

The equipment has been maintained in good order.

The new freight house and tracks at Charlestown were brought into use October 1. The house is of brick, 1,192 by 30 feet, and is divided by brick walls into four sections. It is provided with every facility for handling freight.

The Handling of Freight in New York City.

The second part of the report of the committee of the American Society of Civil Engineers on Rapid Transit treats of "The Best and Cheapest Methods of Delivering, Storing and Distributing Goods and Freight," a question affecting most closely the commercial prosperity of New York, and one whose neglect will be likely to threaten the future commercial importance of the city more than any possible new railroads to Boston or Baltimore, or improvements of the mouth of the Mississippi or opening of canals through the Alleghenies.

Your committee feels very fully impressed with the belief that the freight question, although it has attracted less public attention, is of even greater and more vital importance to the prosperity of the City of New York than the rapid transit question.

The plans now in use for receiving and handling a large portion of the produce and goods which arrive in the City of New York for export and for distribution were made by a preceding generation. They may have been wise and liberal in their day, but they were designed with sole reference to water transportation, and for a business very much smaller than that of the present day, and, in some respects, of different character. They have now been fairly outgrown by the enormous increase of trade, and a new element has been introduced by the invention and rapid development of railways, so that methods which were once the cheapest and best adapted to the commerce of this port, now prove cumbrous, complicated and expensive, simply by the growth of the traffic.

It is the opinion of your committee that several millions of dollars can annually be saved to the merchants of this city and to the country at large by remodeling and improving the mode of transacting some classes of business.

Deeming all theories and plans of but little value unless based upon the solid ground of ascertained facts, your committee, from the beginning of its inquiry into the handling of goods and freight received at this port, undertook to ascertain the exact volume and weight of the receipts of each class of articles from all sources, distinguishing between those received by railroad and those coming by water. The results were carefully tabulated, and in the tables it is attempted to show the general method of dealing with each class of articles after arrival, and the cost per ton, as well as the aggregate cost of conveying, storing and finally disposing of them. In other words, the committee undertook to ascertain the actual terminal expenses incurred for each class of articles while in the hands of the New York merchants.

For lack of sufficient time these tables have not been completed. Notwithstanding the valuable aid afforded by the members of the Produce Exchange, and by many gentlemen in possession of particular facts, it was found that the data were so scattered, that there were so many articles of which no returns could be obtained, such as market produce, lumber, brick, stone, &c., &c., arriving for local consumption; that there were besides so many variations in the cost of handling the same class of articles, that nothing like a full and complete table could be constructed in the time at the disposal of the committee.

The committee, however, appends hereto a table pertaining to the receipts of domestic produce, which it has been enabled to compile with sufficient accuracy to form some idea of the charges which arriving property has to bear at this port.* It will be noted that these charges vary from $1 to $10 per ton, and that they averaged $3.07 per ton upon the 4,631,700 tons of receipts covered by the table. That some of these can be materially reduced will, perhaps, be shown best by taking up the case of particular receipts. Thus flour arrives mainly by rail and is generally delivered at Coenties Slip. It is thence carted to various stores in the vicinity, at a cost of about 4 cents per barrel. The storage charged is generally 3 cents per barrel per month, and as it is estimated that the average time is about a month and a half, this amounts to 4½ cents per barrel, in addition to which 3 cents are charged by the store for handling in and out. When sold, the flour is delivered from store at a cost of 7 cents per barrel if lightered, and of 8 cents if drayed; say an average of 7½ cents. These various handlings, however, injure some of the barrels, and it is estimated by those in the trade that there is a cost averaging 3 cents per barrel for re-coopering. If this flour could be delivered direct from the railroad cars in which it arrives, into warehouses suitably located, the cost would be diminished by at least 7 cents per barrel, thus effecting a saving, in this item alone, of at least $225,000 a year in extra drayage, handling and re-coopering.

In the case of cotton, which mainly arrives by water, a considerable part of the receipts is drayed from the vessels to stores and cellars in the vicinity of Hanover Square, and when sold is drayed back again to the water's edge to be shipped to destination. One of these two drayages, which cost about $2 per ton, could be saved by a proper system of warehouses located on the water front, and they moreover expose the cotton to a waste and stealage, which is estimated by parties in the trade as averaging from 10 to 15 pounds per bale. It is estimated that an average of about 30 cents a bale can be saved by improved methods, and this alone will amount to $286,500 a year.

Reference is made to the table for other classes of property upon which needless terminal expense is incurred. It may, however, be stated in general terms that, in consequence of the manner in which business has grown to be managed, there is now a needlessly large amount of double handling and drayage on many classes of goods which can be sold by sample or grade, and which are loaded and drayed inland to the store or cellar of the consignee, only to be reloaded and drayed back again to the water's edge; and in some cases reshipped by the very line which originally brought them in.† These are onerous charges; they have already decreased the relative share of the total business of the country transacted through the port of New York, and they may in the future seriously diminish it still further. Indeed, matters have now reached such a condition that it is probable that well regulated monopolies would serve the public better, and would prove cheaper than free competition.

The first relief which suggests itself is to reduce still further the transportation charges, both by water and rail, particularly the latter, which each year gathers an increasing proportion of the tonnage. The railroads within the past ten years have reduced their freight rates to two-thirds or one-half their former charges, and it seems logical that they should be asked to reduce them still further. Your committee hopes, however, to make it clear that there is a much more pressing need of a reform which shall be local to New York than of a further reduction in freight rates; especially if by the reduction the aggregate profits of the carriers are to be cut down; it submits that the true way to cheapen transportation and other commercial charges should lead us rather to seek for cheaper and more effective methods of conducting the business than to endeavor to cut down the profits of those who transact it, to less than a fair return upon their investments. While, therefore, fully recognizing the justice of the demand of the public that charges for freights shall be reduced to a minimum, that the cost of transportation shall be cheapened by every means which human ingenuity can devise, your committee wishes to call attention to the fact that, so far as it can ascertain, railroad rates from the interior of the United States to the seaboard are to-day lower than for equal distances anywhere else in the world. Notwithstanding our inflated currency, our high rates of wages and our comparatively sparse population, our railroads are carrying certain classes of property more cheaply for long distances than any European lines.

The regular all-rail rates on fourth-class goods, which include oil-cake, mill-feed, oats, corn, wheat, flour, pork, bacon, beef, tallow, lard, potatoes, peas, beans, starch, soap, whiskey and tobacco, have been, during the past summer and fall, 37½ cents per 100 pounds from Chicago, and 44 cents per 100 pounds from East St. Louis. This gives the following rates per ton and per ton carried one mile:

Route.	From Chicago. Miles.	Rate per ton.	Rate per ton per mile, cents.	From East St. Louis. Miles.	Rate per ton.	Rate per ton per mile, cents.
Via Penn. R. R. system	913	$7 50	0 821	1,063	$8 80	0.828
Via Erie Railw'y and allies	957	7 50	0.783	1,160	8 80	0.758
Via N.Y. Cen. R. R. and allies	979	7 50	0.766	1,167	8 80	0.753

These were the regular rates, while it is notorious that in their fierce rivalry these railroads have frequently cut these rates and accepted much smaller prices, amounting in some recent cases to charges of 0.48, 0.49 and 0.52 cents per ton per mile, while the regular rates as above yield little more than 0.75 cents per ton per mile.‡ This, too, includes the delivery from the railroad depot to a public store or the vessel or wharf of the consignee. How onerous this is, may be judged from the fact that the Pennsylvania Railroad was put to an expense of about $700,000 for receiving and delivering 1,100,000 tons of freight at Jersey City during the year 1873; that the Erie Railway reports to the State Engineer its terminal expenses in 1873 at New York were $823,793 32 on a commercial business of 1,468,928 tons, or nearly 6 per cent of its entire operating expenses, which were $14,174,185 59, and that the New York Central Railroad reports it expended in the same year $59,151 73 for hauling freight cars in New York city and $545,429 25 for lighterage and cartage.

In general terms, it may be said that it costs from 22 to 85 cents per ton to convey property arriving by rail from the railroad depot to the usual points of delivery about the harbor of New York, and that this cost is included in the freight rate; that it costs an average of about 65 cents per ton to transfer from Jersey City to New York, and that therefore this three-fourths of a mile of distance, with the present imperfect methods of doing the business, costs as much as the freight on 85 miles of railroad and virtually lengthens the roads to that extent.

It is evident that this great cost is eventually charged to the public, and that whatever of cheapening can be effected by improved methods will result to the benefit both of the public and of the railroads.

The New York Cheap Transportation Association state in its report on terminal facilities (page 35) that "New York importers are sending goods from Europe, destined to the interior, to Baltimore and thence by the Baltimore & Ohio Railroad, on through bills of lading, to destination. Interior merchants insist upon such a course, as the freight is cheaper both by ship and rail, the ship freight being 5 shillings per ton cheaper, and the rail rate from 5 to 20 cents per 100 pounds less, while the cost of transfer is *nothing*, and the responsibility direct, against $5 per ton in carting, damages, stealing, delay, storage, insurance, &c., in New York. Is that statement (which is true) creditable to New York, and can she continue to prosper under such a condition?"

The above estimate of $5 per ton for terminal charges in New York seems at first somewhat startling. It seems incredible that the handling and conveyance of property in the city (perhaps one mile) should cost two-thirds of the freight from Chicago, a distance of 913 miles. It appears however, from the table hereto appended, that there are many classes of articles upon which the terminal charges amount to $5 per ton, and that the average cost on the 4,631,700 tons tabulated, is $3.07 per ton, or more than three-fifths of the freight from Chicago. This, too, is wholly upon receipts of domestic produce, while all the information the committee has been able to gather points to the fact that greater expense is incurred in the case of importations of foreign merchandise.

The committee estimates that the total receipts from all sources aggregate about 15,000,000 tons a year. A statement compiled by Mr. H. C. Gardiner, in 1867, aggregated 11,915,425 tons. Probably about one-half of this, say 7,500,000 tons, was carted more or less through the streets of New York. Now, for the year ending Oct. 31, 1874, there were licensed by the Mayor's bureau (as appears by information kindly furnished by the Mayor's marshal) 8,618 trucks and carts and 1,889 express wagons, making a total of 10,507. This did not include the wagons, trucks or carts owned by the larger incorporated transportation companies, by merchants, manufacturers, or the express companies, such as Adams, United States, &c., &c., which take out no licenses, and which are estimated by the Mayor's marshal as nearly equal in number, making a total of 20,000 in the city. Now, if we make the generous allowance that one-half of these were engaged in supplying the local wants of the population for transportation, and that the remainder earned an average of $1,200 a year, or less than $4.00 a day, we have yet an aggregate of $12,000,000 a year as the cartage bill paid by the commerce of New York, or an average of $0.80 per ton on the entire tonnage, and of $1.60 a ton on the 7,500,000 tons which are estimated to be carted.

While, therefore, it is right that the railroads should, and they doubtless will, further reduce their charges by the adoption of more efficient methods of working, the most pressing reform needed seems to be local to New York and to require some modifications of the existing methods of handling the property after it arrives at this port. The merchants and citizens of the city should give their attention to the devising and adopting of such improvements as will reduce the terminal charges to a minimum. It is the opinion of your committee that a larger saving may thus be effected than by any probable reduction of freight rates.

DISPOSITION OF RECEIPTS OF GOODS.

Goods arrived at this port for three purposes:

1st. For local consumption.

2d. For immediate export.

3d. For distribution to the surrounding country or eventual export.

The first class of receipts has partially regulated itself, so that the needless expense and waste are not very great. The heavier articles, such as coal, lumber, stone, brick, lime, &c., are taken directly to convenient points, from which they are distributed as wanted. Our market system however is not creditable to the city, and is needlessly expensive. The markets occupy valuable room on the water front, and are so far from the population to be supplied that they mainly serve as purchasing bazaars for the retail dealers scattered throughout the city, who supply the customers. This not only involves in many cases a needless intermediate profit, but it demands a much larger number of dealers than would be necessary under a better system of working. Almost every block has its butcher shop or grocery, where meats, vegetables and supplies are furnished, thus adding doubtless to the convenience of the customer, but enhancing the cost. If the trade could be concentrated at suitable points, to which the customers would repair, the traffic could be done by fewer persons, who now waste much time waiting for customers, and they could make larger aggregate profits while selling at lower prices, in consequence of the larger volume of their trade.

Receipts of the second class are now handled nearly as well as they can be. They are taken in most cases directly from the transportation line which brings them to the steamer or vessel which is to convey them away. Some improvements are perhaps possible in the modes of transacting this business, and especially in applying steam or other power to the lighters, so as to reduce the cost of handling; but these changes will be incident to any improved methods to be applied to receipts of the third class which come to this port for sale or speculation, and are held here for some little time. It is in this third class that great carting,

* The committee also hands in to the Society a large mass of information which it has gathered on this subject, and which it hopes hereafter to take up, or to place at the disposal of parties who may wish to continue this important inquiry.

†Owing to its volume and to the crowded condition of the streets, this cartage is also needlessly expensive. There are frequent stoppages in the streets and much waiting at the points of delivery. Drays stand sometimes as much as 24 hours in line, waiting for a chance to unload at a foreign steamer, and in one instance which was cited to your committee a shipment of salt fish, and in another, a shipment of butter, cost $10 per ton for drayage from the store to the foreign steamer. In one case cited by Mr. Walker, Statistician of the Produce Exchange, from whom valuable aid was received, drayage on his household goods from Brooklyn to the New York Central Railroad Depot was more than the freight thence to Buffalo, a distance of 440 miles; and in another case quoted by a firm in the South American trade, the drayage from store to ship was more than the freight from New York to San Francisco, around Cape Horn.

‡ Since the above was written, there has been a further reduction of all-rail rates. The present nominal rates on fourth-class goods (Feb. 10) are 35 cents per 100 pounds from Chicago to New York, and 40 cents to Boston. From East St. Louis they are 39 cents to New York, and 44 cents to Boston. Material concessions, however, are made, and agents accept almost "anything they can get," amounting in some cases to only about one-third of a cent a ton per mile. A recent invoice of cotton was hauled over 400 miles by rail and delivered to ship in this harbor at a rate which yielded $1 80 per ton, or less than the cartage in this city would have been to store and back.

waste and stealing occurs, and it is precisely in this business that New York has to compete with other cities.

Goods arriving for sale will bear extra handling and drayage —first, if they must be shown to the customer before effecting a sale, second, if their value is great in proportion to their bulk. Thus a ton of tea, worth say $1,200, is enabled to bear very considerable drayage, while a ton of coal, worth $5, can bear but little expense.

The cheaper the goods in proportion to their weight and bulk, the less can they afford handling; and it would seem to be the part of wisdom to provide storage facilities for these, at convenient points of concentration, and as near to the points of arrival as possible, where they can be deposited until wanted for shipping or local consumption; the sales being effected by sample or grade.

The mode of arrival of goods destined for future sales determines in a great degree the best method of dealing with them. If they come by vessels, similar products can be concentrated at one point on the water front, and a saving thus effected in handling, inspection, superintendence and protection both from the weather and from theft. If, however, the articles arrive by railroad, it would add to the expense to concentrate the receipts from all sources at one single point, and it would prove cheaper to unload and store them in close proximity to the various termini of the roads, and to rehandle them only when their final destination becomes known.

It is greatly to be regretted that the city of New York was not originally laid out upon the principle of having a strip of lots or ground between the bulkhead and the first street parallel with the shore. This would have afforded an opportunity for the cheap storage of commodities destined for export or distribution, without carting them inland. As now arranged, the existence of streets next to the docks and bulkheads throw such a large traffic upon them longitudinally as to make the land side of the streets nearly worthless for storage purposes. The goods cannot, with economy, be transferred across the longitudinal traffic, from the water front to the other side of the street. So much, indeed, does this press upon the street, that in 1871 the Dock Commissioners adopted the plan proposed by their Engineer-in-Chief, Gen. George B. McClellan, and have commenced the work of widening the streets to a width of 250 feet along the North River, 200 feet along the East River from the Battery to Grand street, and 175 feet north of that point. No special plans beyond this seem to have been entertained.

The question now occurs, how this most desirable improvement of widening these streets can be made of the utmost use in cheapening and facilitating the commerce of the port. If it be all left as an open street, it will doubtless relieve the jam of trucks and drays now existing, but it will not decrease the amount of drayage required, nor make it more feasible to carry goods across the street to warehouses on the other side. It will, instead, increase the cost of the latter operation, by reason of the greater distance.

Although the docks themselves are old and worn out, the general pier system of New York is scarcely to be improved upon, except in the arrangement of details. Its alternate piers and slips give the longest wharf and quay lines for a given amount of water frontage; the great improvement, therefore, must come from the proper treatment of the street next to the bulkhead. The docks themselves should mainly be kept unobstructed, to secure the rapid delivery and carrying away of goods arriving for immediate consumption or for local division and distribution; the great mistake was in having a street immediately next to them.

It has been proposed by Mr. H. C. Gardiner (who has explained his plans fully, and furnished valuable aid to your committee), to use a portion of the land reclaimed for this street for the purpose of building an elevated viaduct railroad of two or four tracks, either upon iron trestles or on masonry, around the bulkhead line, from which tracks, spurs and switches should be run at an elevation of 18 or 20 feet above the docks to some ten warehouses to be built upon piers to be bought from the city. Although it contains some valuable features, your committee cannot fully approve this plan. The viaduct would cost from $500,000 to $700,000 a mile, and the foundation of the warehouses 80 feet by 150, and five stories high, (which would have to be carried to great depths with iron or masonry columns, so as to leave unobstructed flow for the tides), would cost from $150,000 to $200,000 apiece. With a view, therefore, of removing the existing difficulties, and cheapening the cost of transacting business in the city of New York, your committee propose five remedies to be further discussed by your society and by the parties whose interests may be affected thereby.

REMEDIES PROPOSED.

1. We suggest that in addition to the 13 existing city markets, there should be more retail market houses, say 20 in number, at convenient points throughout the city. These should be of medium size, covering about half a block each, and can best be built and managed by joint-stock companies or associations, as in Philadelphia. They would by no means obviate the necessity for one large wholesale market, such as Washington Market is now; but by concentrating trade, and bringing the producer and consumer together, they would promote the economy of both. If these houses are properly located, the dealers will be insured a volume of business so much larger than with the present corner-grocery system, and their rents will be so much less, that they can sell at lower rates, while realizing greater aggregate profits.

It may be laid down as a general principle that supplies intended for local consumption should be taken, immediately upon their arrival, to some interior point convenient for their distribution; and for this purpose we do not believe any system of transportation can be devised superior to the present methods of transportation by wagons.

2. We suggest that the Society discuss whether it is not possible to adopt an improved system of lighterage to ships and docks, by which the boats and barges shall be better adapted to each class of the traffic, and, in order to save handling, be loaded and unloaded by steam or hydraulic power. In connection with this, we wish to commend the system of delivering and receiving goods directly into the railroad cars placed on barges, at various points of the water front, and to suggest whether drayage cannot be saved from the interior of the city, by extending this system, so as to receive at additional points scattered along the water front. It is probable that in the latter case a small extra charge per ton received would have to be made at those points where the traffic was light, in order to cover the extra cost of check clerks, and the necessary subsequent sorting of miscellaneous receipts. The details would have to be discussed and agreed upon, in connection with the railroads, but the plan would seem to promise some economy, by saving cartage to the merchants.

3. We suggest that there should be, in close connection with each important railroad terminus at this port, a system of fire-proof storage warehouses, for the custody of all bulky or low-priced goods not going into immediate consumption. These should front upon a basin or slip, the railroad tracks being upon the other side, or else inside the warehouses. They should be divided into chambers or bins in which the goods would be stored, preserving the identity of each lot not admitting of grading. Each invoice might be divided into round lots, corresponding to the number of such articles generally transferred at a sale, and separate assignable receipts given for each, the property being deliverable upon return of such certificate properly endorsed and audited. Upon these receipts advances could be obtained, and no expenses except storage would be incurred upon the goods from their arrival at the railroad terminus until they were sold. The same system could be extended to imported goods in bond, destined for the interior of the country, and berths provided for foreign steamers in connection with the basins or slips. In every case the New York merchant or importer would sell by sample in his counting-house, and transfer the property by merely giving an order on the warehouse.

There is not the slightest necessity for waiting until the railroads inaugurate such a system, and indeed it is doubtful whether their charters will permit them to engage in a general storage business, or to make advances on consignments such as would be required. If for these or financial reasons they are not prepared to undertake the scheme themselves, contracts can probably be made with them to transact that portion of their business not requiring immediate delivery, in connection with a series of warehouses owned and managed by associations of citizens. The New York Central has land at Sixty-fifth street; the New Jersey Central, the Pennsylvania and the Erie, each has surplus lands on the Jersey shore, which could be devoted to such purposes; and there is a piece of ground, admirably situated between the lands of the Erie and of the Delaware, Lackawanna & Western Railroad, which could be made accessible to both those companies. It can be shown that such improvements would save considerable expense to the commerce of this port, and would prove remunerative to the owners. We consider them almost indispensable to an economical handling of railroad receipts of which the final destination is not known.§

In connection with this warehouse system there should be grain elevators at each railroad terminus. The mistake should, however, not be made of building them as storage elevators alone, and attempting to pass all the grain through them.

In consequence of the peculiarity of the commerce of this port, that a considerable portion of the grain receipts is at once transferred to ships, and that the trade is done, to some extent, in large steamers, which cannot leave their berths to go after parts of their cargoes, a portion of the grain will have to be transferred direct from cars to lighters, and, for this purpose, an elevated trestle with chutes is cheaper than an elevator. The latter will serve rather as reservoirs to equalize the flow—to permit prompt unloading—to consolidate receipts, and to load rapidly the smaller sail vessels which take whole cargoes of grain.

4. As a very large share of the commerce of New York arrives by water, and the city is naturally desirous to have its property stored within its own limits, and under its immediate control and laws, we suggest that a portion of the new street, say about 100 feet, now being built by the Dock Commissioners, be set apart for a row of warehouses, storage yards and manufacturing establishments, encircling the water front of the city. Suitable spaces should be left between them to give access to the piers. The city may retain the ownership of the ground, and lease it on long terms, say fifty years, to any parties who may choose to build, at a fixed rate of interest upon valuations to be periodically ascertained by appraisers, or it may sell the fee to the land. Each warehouse being independent of the others, and of the general system, it can be owned and controlled by a different owner, and put to use as soon as completed.

The warehouses and manufactories should be as nearly fire-proof as practicable, and should be built upon a general system, under specifications and inspection furnished by the proper department of the city government. They should be provided with steam or hydraulic power for elevating goods, and the most approved appliances for saving labor. They would probably have to be founded on wooden piles, but the foundations for a five-story warehouse, say 80 by 150 feet, would, it is estimated, not cost more than $30,000.

To give a general idea of the arrangement we propose, we may indicate that there should be along the North River a quay next to the bulkhead about 33 feet wide from the water's edge, then a warehouse 80 feet deep, next to this a strip reserved for the belt railroad hereinafter proposed, 36½ feet wide, then a raised sidewalk, 8½ feet wide, then a roadway 77 feet wide (or nearly double the width of the present carriage way), then a sidewalk 15 feet wide, as now, next to the existing buildings on the street, thus making the full width 250 feet. Along the East River, unless it shall be thought best to change the proposed width, the dimensions might be a quay 25 feet wide next to the bulkhead, then a warehouse 50 feet wide, then a side track and a single main track occupying 25 feet, then a raised sidewalk of 8 feet, then a roadway 77 feet wide, and then a sidewalk 15 feet wide, thus making up a width of 200 feet.‖

If the quay next to the bulkhead be placed 5 feet, and the railroad side track hereinafter mentioned one foot above the highest tide, the lower floor of the warehouses will be level with the floor of the cars, and there will be a descent of 4 feet in 117, or in 80, as the case may be, from the dock to the crossing of the first rail, which will be an advantage in draying goods off from the docks. We do not give these dimensions as absolute. The details should be carefully considered and the plans matured, but they indicate the general nature of the arrangement, which our experience as railroad engineers teaches us to be economical.¶

The chief service of the warehouses and factories would be to save cartage to the interior of the city and back again. Particular districts for particular branches of business would be indicated beforehand, so as to promote economical concentration of interests. In connection with these warehouses, we suggest that a system of light steamers might ply along the water front, to distribute both freight and passengers.

5th. We would propose, in connection with and adjacent to these warehouses and manufactories, a belt railroad of two main tracks and one side track on the surface of the street. The track next to the warehouses should be a series of side tracks, connected at suitable points, for standing cars, and thus loading and unloading: the other two tracks should be main tracks, one for the traffic in either direction. They should be connected with ferry slips at a number of suitable points, by means of floating bridges, so that the cars of any of the railroads terminating near this city could be placed opposite any of the warehouses or manufactories without passing over any great distance of the main tracks, thus giving to all the railroads access to all the buildings. The road could, in addition, be used to transfer goods from the warehouses to vessels in any part of the water front. It may be built and owned by the city, and, under proper regulations, thrown open at fixed rates of trackage per car per mile, to all parties wishing to use it, or it may be built and managed by an incorporated joint stock company, but controlled by city regulations. In any case, perfect impartiality must be insisted upon, and no exclusive rights whatever granted thereon.

We are not unmindful of the many objections which will be raised to the operating of a railroad across the traffic to and from the docks, unless elevated above the ground. We have, however, proposed to place it on the surface; first, to save in first cost—such a road we have indicated would cost about 40,000 dollars per mile, while an elevated road of equal capacity, proportioned for the weight of standard engine and cars, and appurtenances for raising and lowering them to and from the warehouse, would cost about $500,000 per mile; and second, to save lifting and lowering the goods and the cars. We believe the objections to such a road have been much exaggerated. Not only would the volume of drayage to and from the docks be largely diminished by the system we propose, but the intervening raised sidewalk between the road and the carriage way, and a system of sliding gates at the dock entrances, would prevent all possible collisions with teams. The road would have to be operated by dummy engines at low speed, mainly in the night and at particular hours of the day, say the early morning, the noon hour and the early evening, as is done with the belt railroad on the docks at Boston as well as with the trains of the New York Central Railroad to St. John's Park depot.** Of course, the question will have to be very carefully considered in all its details by you and by the parties interested. If, upon further investigation or trial for a short distance, it should be deemed too objectionable, this feature of our recommendations could be abandoned, as it forms no integral part of the bulkhead warehouse system. In the latter event, freight could still be delivered and distributed from them by water though at somewhat greater cost than with the additional aid of the surface railroad. Although eventually designed to encircle the whole island, this belt railroad need be built no faster than the erection of warehouses and demands of business shall render necessary. For a portion of the distance it is proposed to utilize the space over the two main tracks for new lines of the rapid transit roads when these become needed. Such would stand away from the warehouses, so as not to be interfered with by possible conflagrations; if proportioned for a rolling load of 1,200 pounds per lineal foot of each track, the road would cost about $300,000 a mile of double track.

These schemes, after careful consideration, must stand or fall on their own merits. They are based upon the theory—first, that all goods for local consumption or immediate export should be taken at once by the cheapest method of conveyance to their destination; second, that upon arrival in the vicinity of New York, all goods of which the final destination is not known, should be unloaded into warehouses, and no further transportation expense put upon them until their final destination is ascertained; third, that all transfer, lighterage and distribution should be done by steam where possible, and that rail traction should be made use of where practicable without serious injury to other uses of the ground.

Your committee does not expect that its recommendations will be universally acquiesced in or entirely accepted. These may conflict with previously formed opinions, existing customs or established interests which it will be necessary to consider. Such concessions as do not destroy the efficiency of the plans may reasonably be made. An endeavor has been made to take a general view of the commercial necessities of this port, and to recommend the remedies which seem to promise the greatest economical results, together with fair returns upon the capital that might be required to carry them out. It now remains for the Society, for the parties interested, and for the public to discuss whether these schemes are sound, and are those best calculated to secure the retention by New York of its present position as the leading commercial city of the United States.

Respectfully submitted,

O. CHANUTE,
M. N. FORNEY,
ASHBEL WELCH,
CHARLES K. GRAHAM,
F. COLLINWOOD,
} Committee.

The table appended to this report, which covers a sheet about twice as large as this page, gives receipts by rail and water during 1873 of about 80 articles, giving the quantities in bushels, barrels, packages, etc., as they are reported by the commercial bodies, the estimated average weight, the *tons* of each received by rail and water, a brief statement of the mode of handling each, and the estimated terminal expenses of each per ton and for the whole amount received. Below we have condensed this table so as to show the tonnage of each article received at the port, and the estimated terminal expense per ton incurred by each:

Receipts and Cost per Ton of Handling Produce at New York.

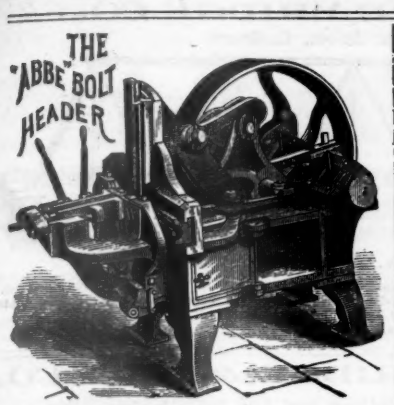
	Tons.	Handling per ton.		Tons.	Handling per ton.
Ashes	2,130	$1 10	Spirits turpen'e	10,849	$1 80
Beeswax	79	3 00	Tar	5.741	3 00
Flour	380,979	2 00	Petroleum	622,267	2 00
Wheat	1,038,748	1 30	Other oils	4,793	4 00
Corn	691,063	1 40	Oil cake	18,815	1 00
Oats	179,521	2 81	Pecans	218	5 00
Barley	44,538	1 91	Peanuts	9,458	5 00
Malt	2,144	2 81	Beef	8,470	1 50
Rye	27,933	1 40	Butter	35.570	3 00
Peas	5,483	1 30	Cheese	60,230	3 00
Beans	6,412	3 00	Cut meats	64,849	1 60
Oat meal	769	3 00	Lard	73,384	2 00
Corn meal	25,616	3 00	Pork	29,177	2 00
Broom corn	581	5 00	Dressed hogs	8,039	2 85
Cotton	214,969	3 20	Eggs	35,435	5 00
Cot'n-seed meal	479	1 00	Grease	2,299	5 00
Copper	11,606	2 50	Stearine	3,283	3 00
Copper ore	23	2 50	Tallow	10,184	3 00
Dried fruits	4,368	3 00	Rice	3,370	3 00
Flax	73	3 00	Clover seed	5,323	3 00
Hemp	1,742	3 00	Flax seed	531	3 00
Hides	69,125	10 00	Cotton seed	20	4 00
Horns	1,364	10 00	Skins	357	4 00
Hops	1.840	5 00	Sumac	63	4 00
Lead	1,169	4 00	Spelter	41	3 00
Leather	40,405	2 35	Starch	6.512	4 50
Cattle, hogs and sheep	561,316	10 00	Tea	3,938	5 00
Calves	5.830	12 00	Tobacco	150,000	3 30
Cows	3,150	2 00	Tow	31	3 00
Moss	293	4 00	Whiskey	34,097	3 00
Molasses in bbls	13,179	4 00	Wool	9,226	4 00
" in hds	265	5 00	Wine	190	4 00
Sugar	2,794	3 00			
Crude turpent'e	1,785	1 80	Total tonnage and average cost	4,631,700	$3 06
Pitch	316	1 80			
Resin	65,830	1 80			

§ As early as 1867 one of the members of the committee, impressed with the importance of such a system, secured, for the purpose of carrying out the plan above referred to, some seventy acres of space at Harsimus Cove, on the Jersey shore, for the system of railroads between New York and Philadelphia.

‖ Since this report was written, it has been understood that the Dock Commissioners have decided to reduce the proposed width of South street to 140 feet, from the Battery to Montgomery street, and to 100 feet from that street to Grand street. The width of the street northerly from that point has not yet been determined. This reduction will preclude the construction of warehouses along the bulkhead line on the East River.

¶ The total available water front of the city is 24¾ miles in length. The proposed improvement of the Dock Commissioners contemplates on the North River, from the Battery to Sixty-first street, a river wall line of 25,743 feet, and on the East River, from the Battery to Fifty-first street, a river wall line of 27,995 feet, or a total of 53,738 feet, say 10 miles. If we deduct three miles for streets to the piers, spaces between the warehouses, storage yards and manufactories, and for other purposes, there yet remain seven miles available. This ground will not be worth on an average less than $1,000 per front foot, so that should this plan be deemed practicable the eventual result might be to place about $35,000,000, or the interest thereon, in the city treasury, to say nothing of the increased taxation upon the buildings erected along the bulkhead lines. As none of your committee expects to make a single penny out of the plan here recommended, they hope it will not be thought an objection that, in the words of Col. Sellers, "There's millions in it."

** The above warehouse plan differs from those which have hitherto been proposed—first, in placing the warehouses on the bulkheads instead of the piers; second, in having a continuous line of them instead of only ten isolated buildings; third, in placing their general control in the hands of the city instead of a private company; fourth, in extending their benefits to any citizen who chooses to build one; fifth, in placing the belt railroads for heavy engines and cars on the ground instead of in the air, and sixth, in placing an elevated road overhead, for light passenger traffic only, should subsequent needs demand it, thus decreasing materially its cost, as see hereafter.



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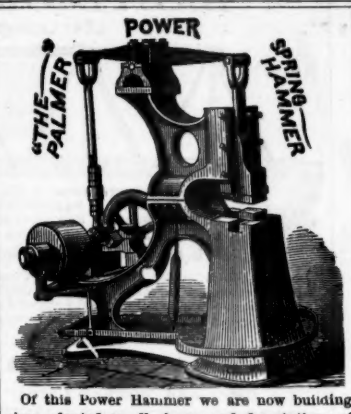

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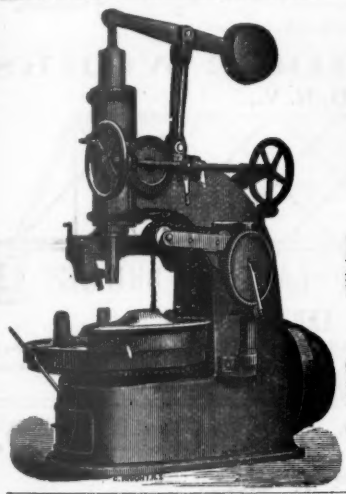

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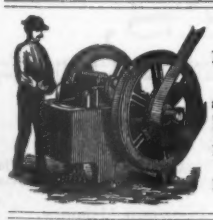

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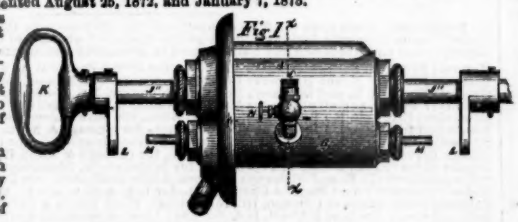
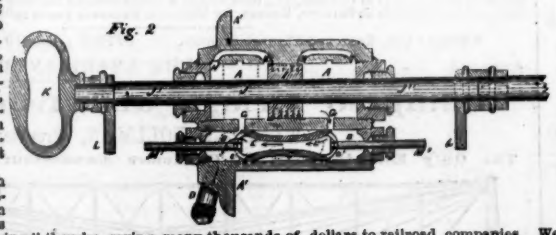


The ringer consists of a steam cylinder *A*, steam chest *B*, with balanced valve *E*, operated by the tappets *L L* on the piston rod. The bell rod is a continuation of the piston rod, and attached to bell crank. The valve *E* receives steam in the centre and exhausts at the ends. *H H* are relief passages, allowing the air or vapor in the end of cylinder to escape around the piston *I*, and by removing the resistance allow the piston freedom to follow the momentum of the bell until it stops.



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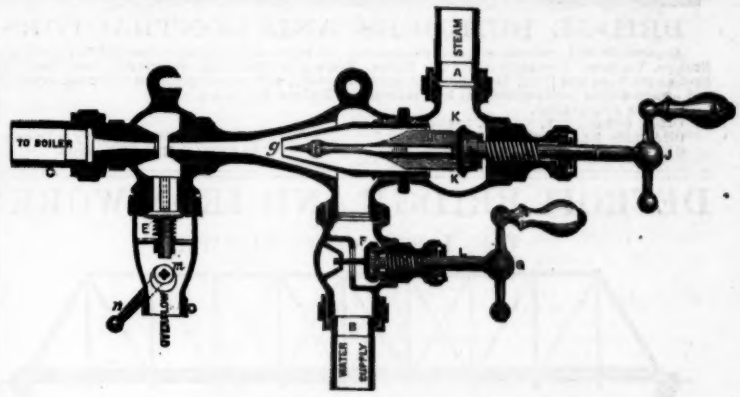

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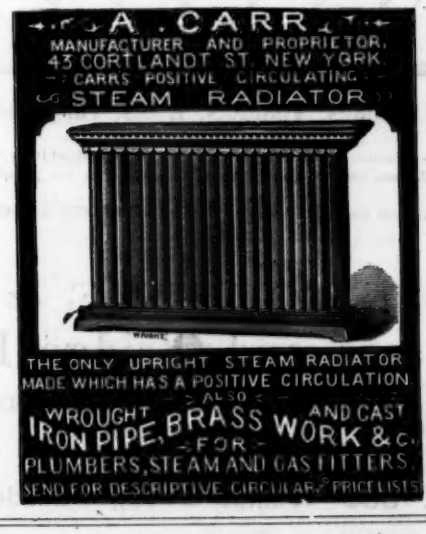
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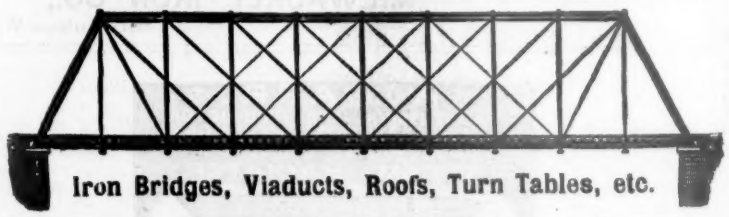

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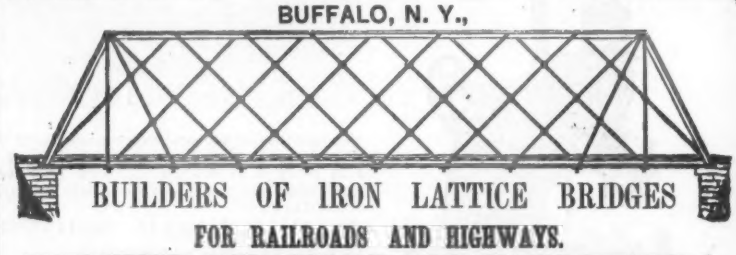

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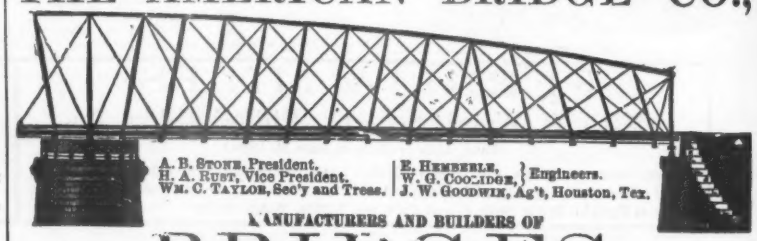

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